

# **Run 15 RHIC Machine/Experiments Meeting**

30 Sep 2015

**Run 15 Summary Slides**

## Who's Who for 2015

RHIC 100 x 100 GeV polarized protons:

**Run Coordinator:** Vincent Schoefer, [schoefer@bnl.gov](mailto:schoefer@bnl.gov) , 631-344-8453 (office)

RHIC 100 x 100 GeV/n polarized protons on gold and polarized protons on aluminum:

**Run Coordinator:** Chuyu Liu, [cliu1@bnl.gov](mailto:cliu1@bnl.gov) , 631-344-4431 (office)

### **Scheduling Physicists:**

Yousef Makdisi, [makdisi@bnl.gov](mailto:makdisi@bnl.gov), 631-344-4932(office) 631-??




Phil Pile, [pile@bnl.gov](mailto:pile@bnl.gov), 631-344-4643 (office), 631-834-2005 (cell)

### **AGS Liaison:**

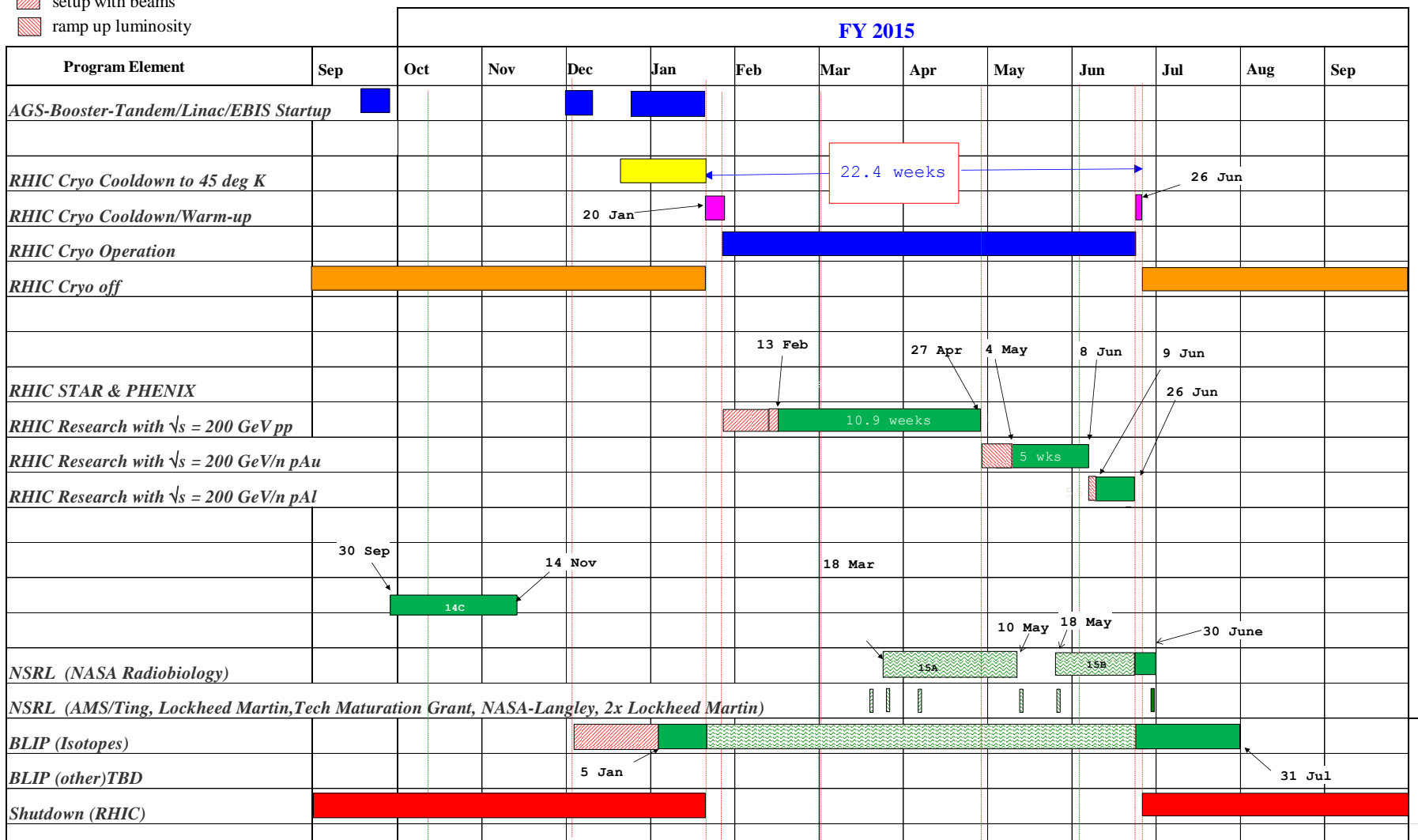
Haixin Huang, [huanghai@bnl.gov](mailto:huanghai@bnl.gov) , 631-344-5446 (office)

# C-A Operations-FY15

30 Sept 15

-  concurrent with RHIC
-  setup with beams
-  ramp up luminosity

as run

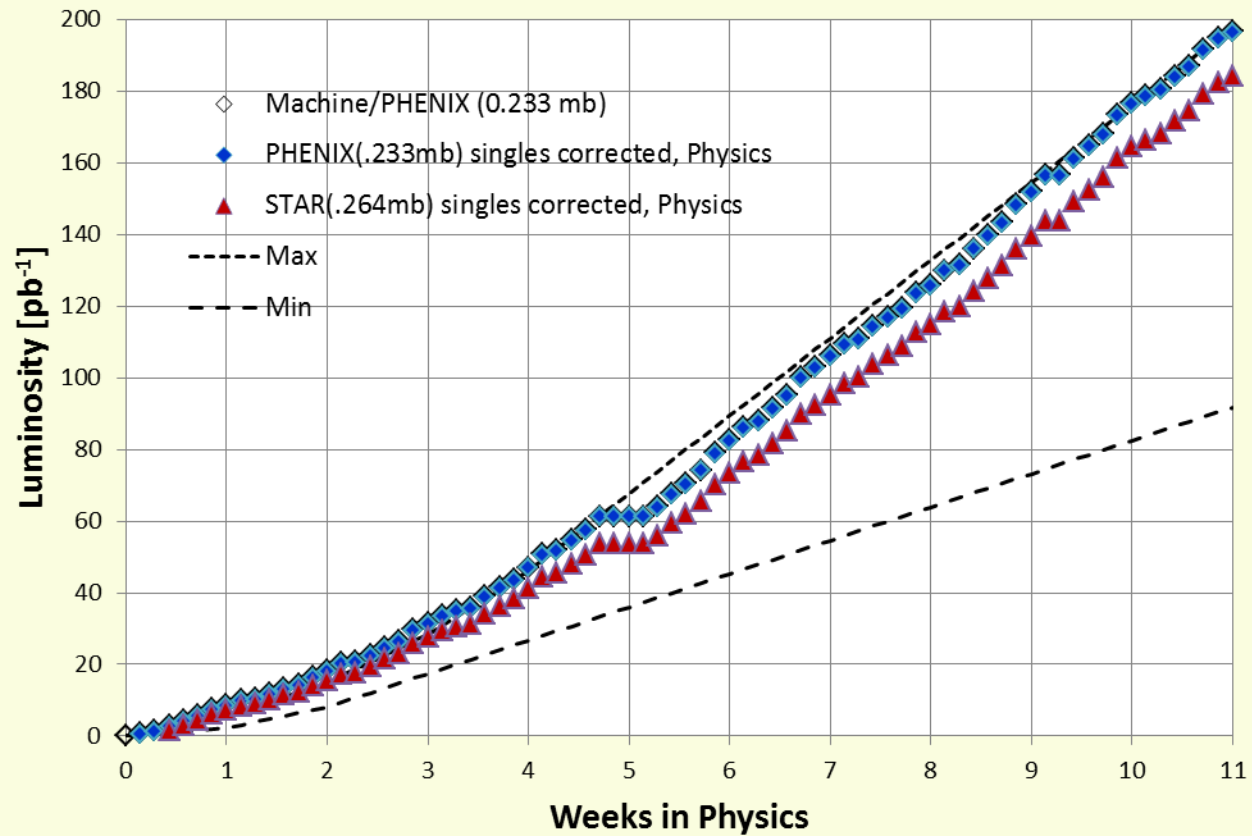


## Run 15 as run

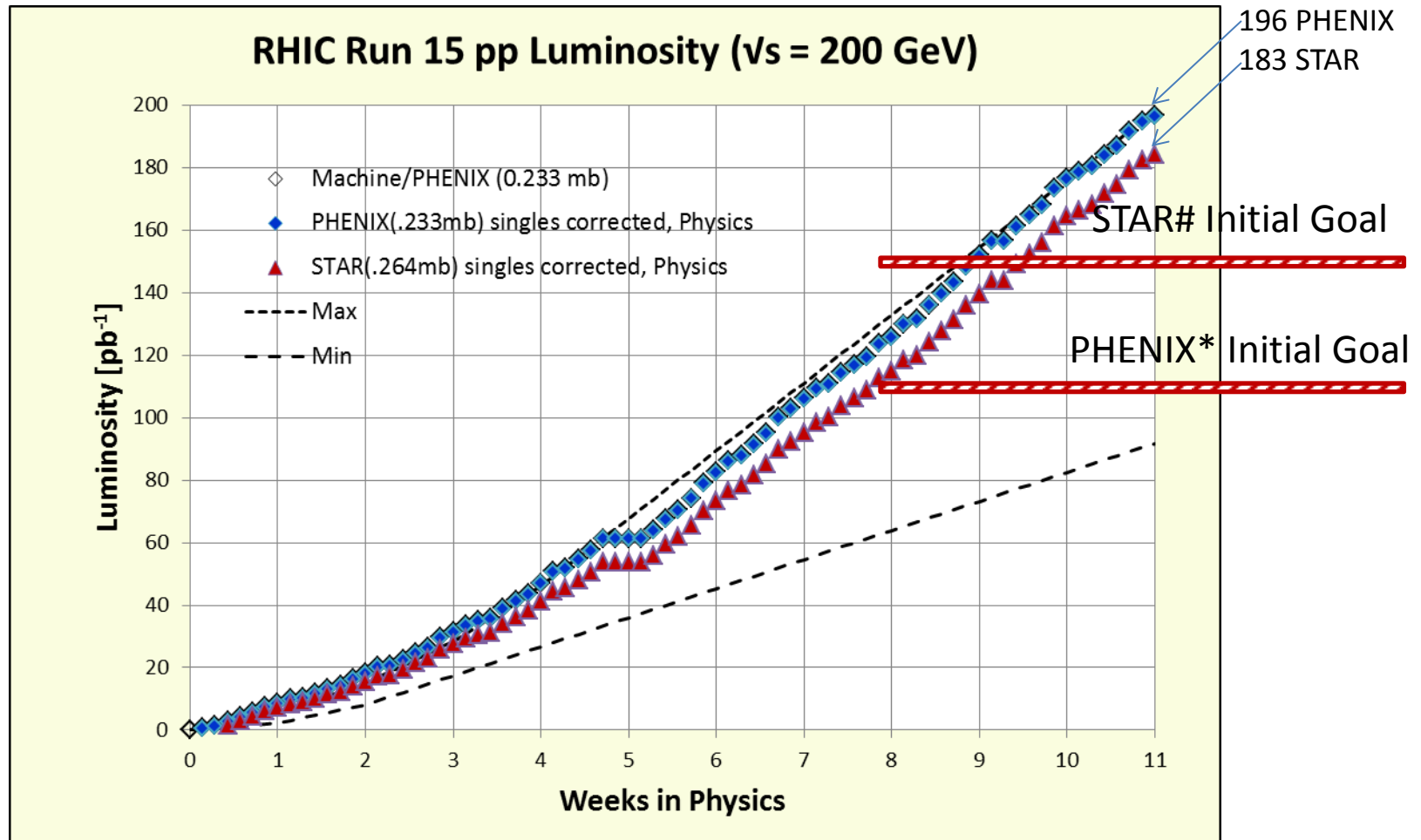
- 20 Jan, Began cool-down to 4.5K
- 21 Jan (morning), Blue cold
- 22 Jan (evening), Yellow cold
- 23 Jan (after midnight), Beam in Blue
- 7 Feb, First overnight stores for experiments
- 10 Feb (3 days early) store 18662, Began 10.9 week  **$\sqrt{s}=200$  GeV pp** physics run
- 14-17 Mar, Power Dip downtime
- 27 April (Mon, 0700), End 10.9 week  $\sqrt{s}=200$  GeV pp physics run
- 4 May (Mon) store 19020, Began 5 week  **$\sqrt{s}=200$  GeV/n pAu** physics run
- 8 June (Mon), End 5 week  $\sqrt{s}=200$  GeV/n pAu physics run
- 9 June (Tue), Began 13 day  **$\sqrt{s}=200$  GeV/n pAl** physics run
- 22 June (Mon), End 13 day  $\sqrt{s}=200$  GeV/n pAl physics run
- 22 June (Mon), RHIC physics ended, complete cryo warm-up delayed for 56 MHz and CeC work
- 26 June (Fri), cryo at half power, **22.4 cryo weeks** of operation

$$\underline{p^+p^+, \sqrt{s} = 200 \text{ GeV}}$$

## RHIC Run 15 pp Final Luminosity ( $\sqrt{s} = 200$ GeV)



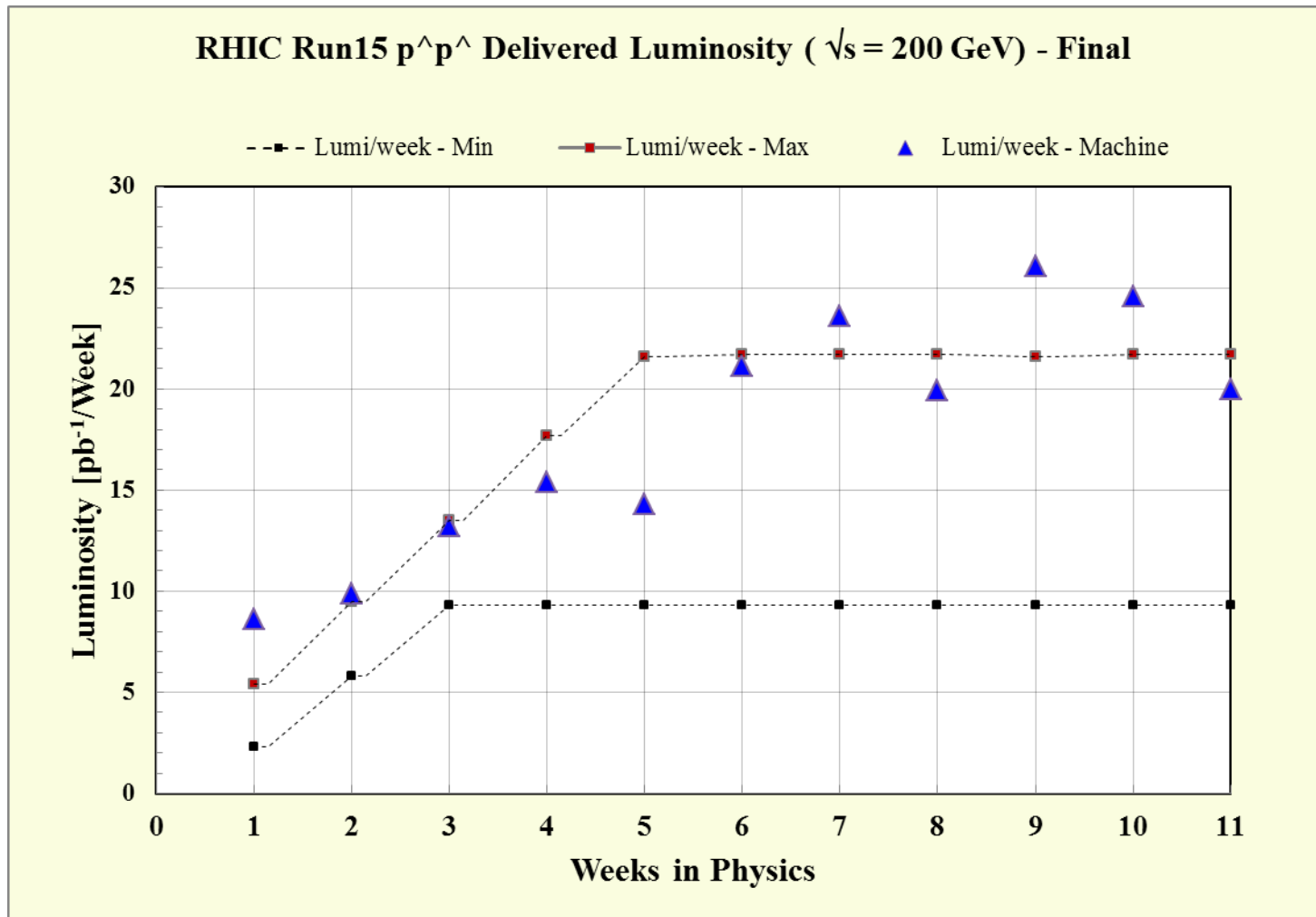
Through final store (18953) 27 April



\*Based on beam use request

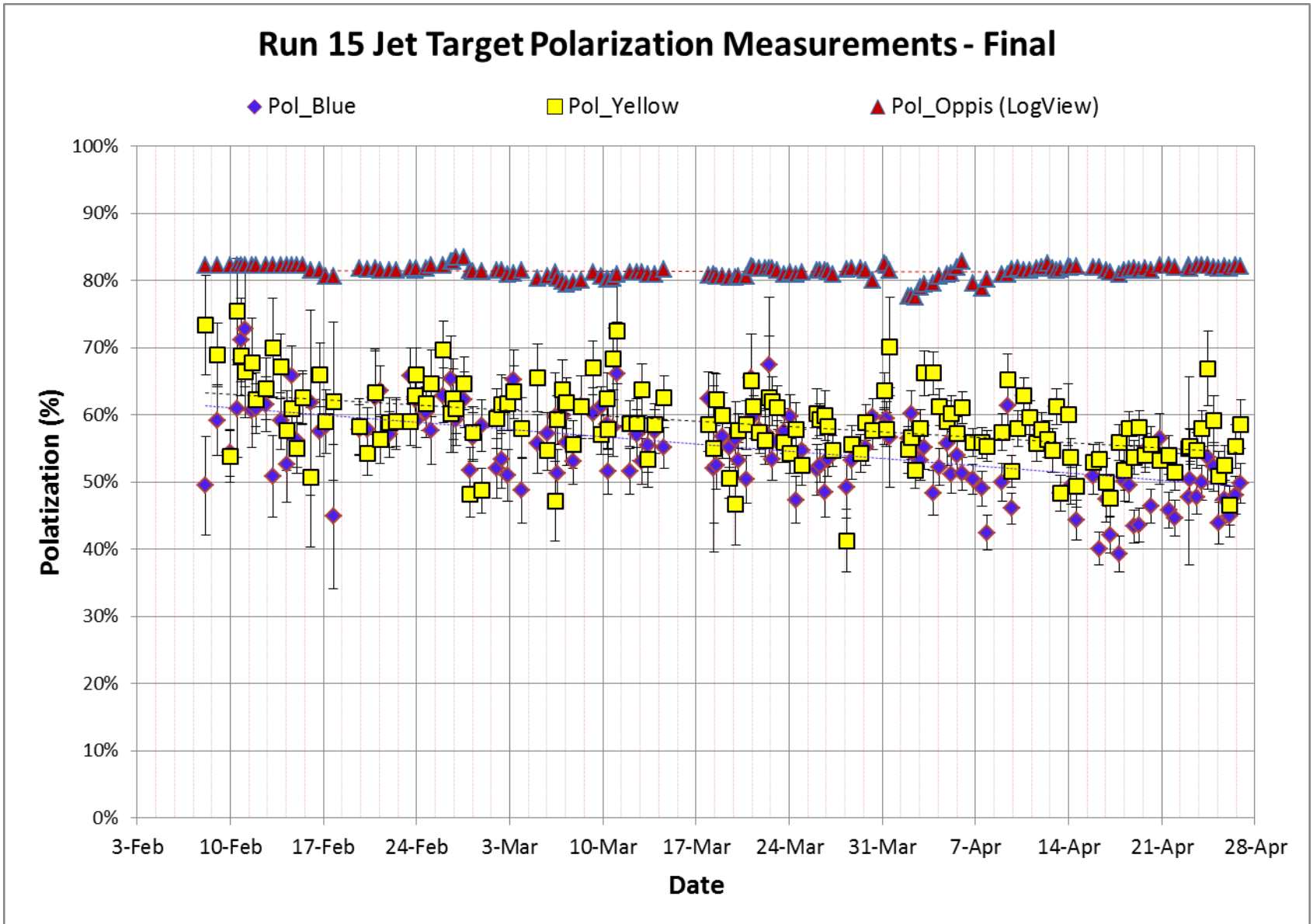
# Based on beam use request with 12 weeks physics

Through final store (18953) 27 April

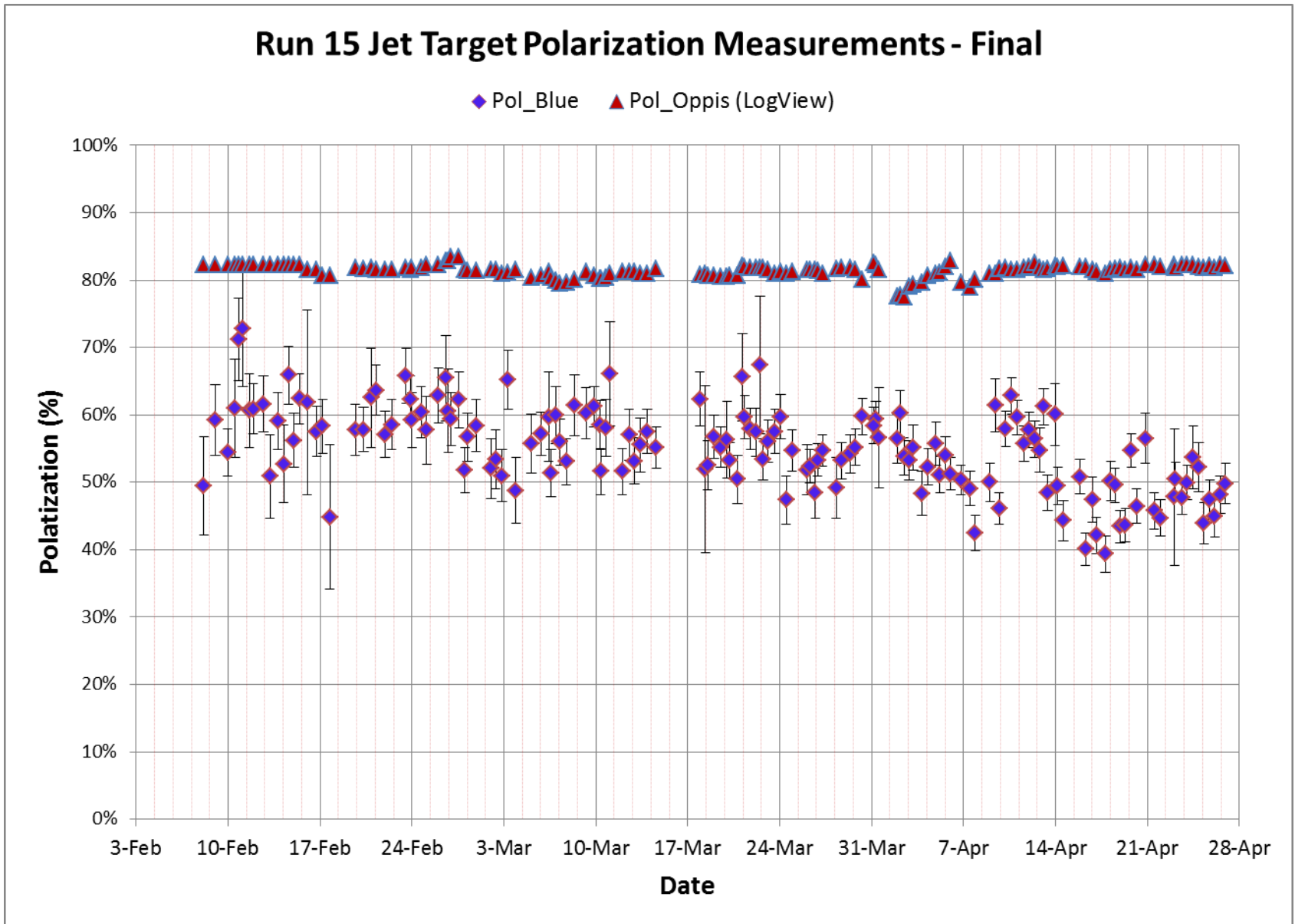




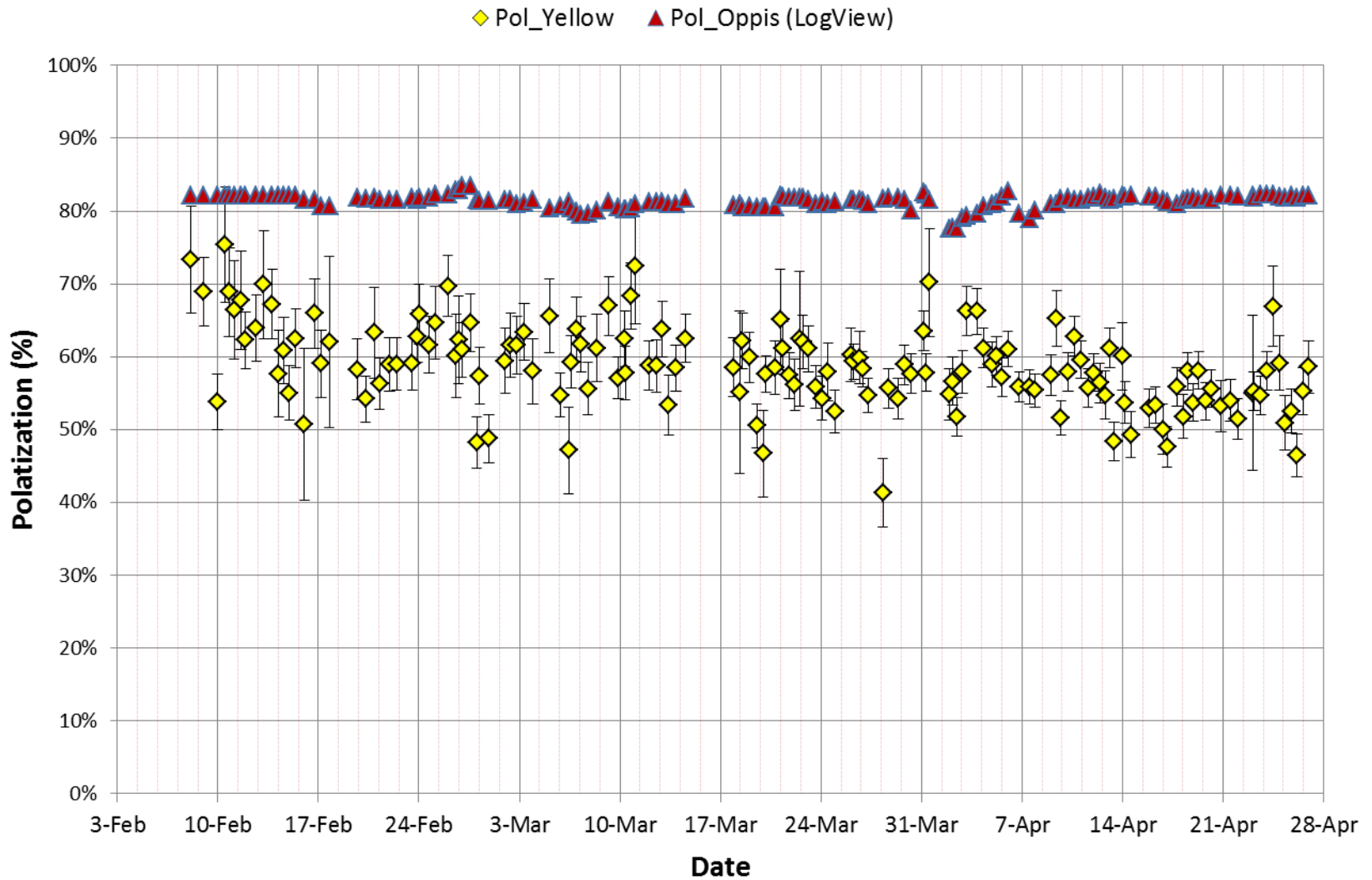
through final store 18953, 4/26/15

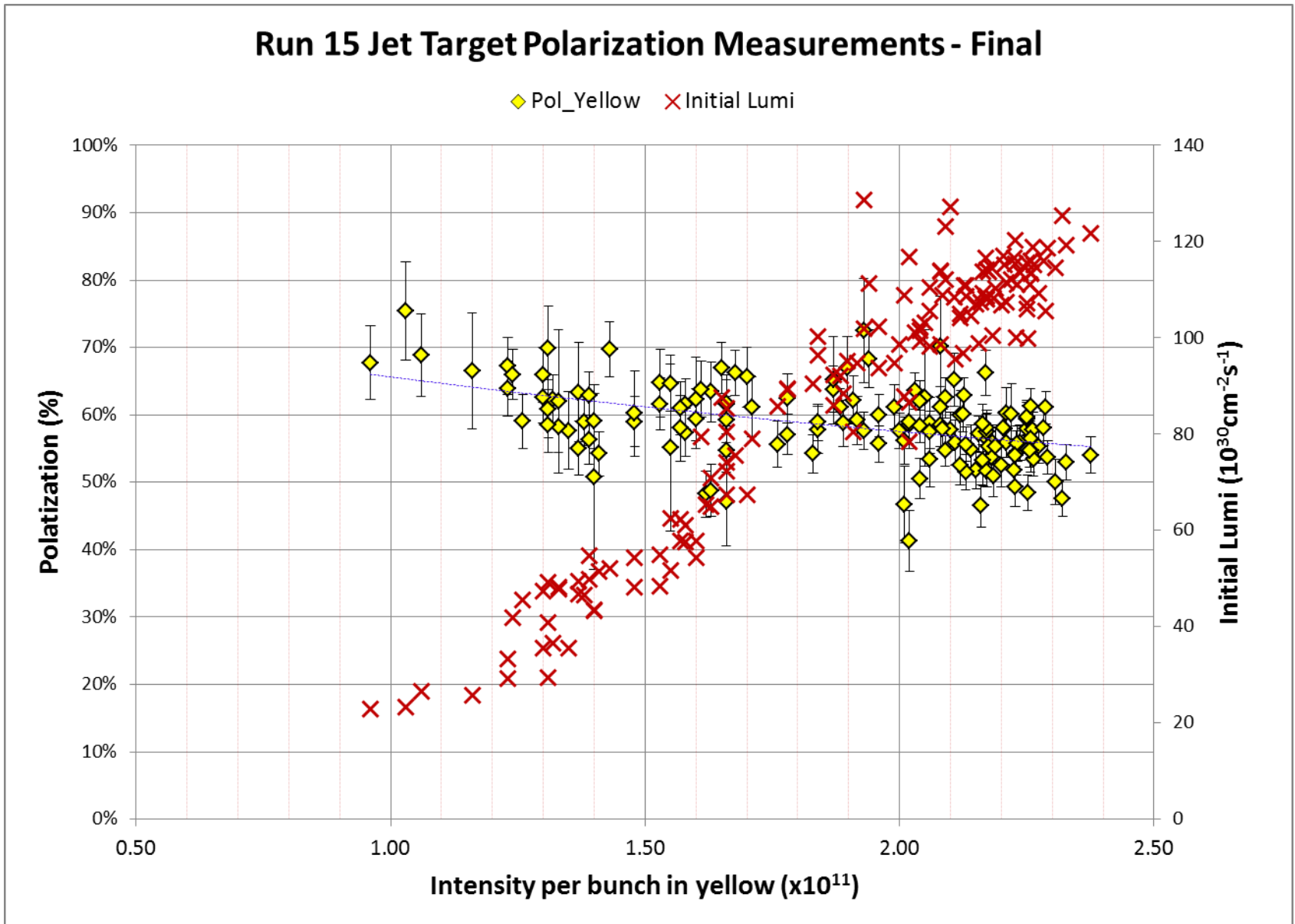


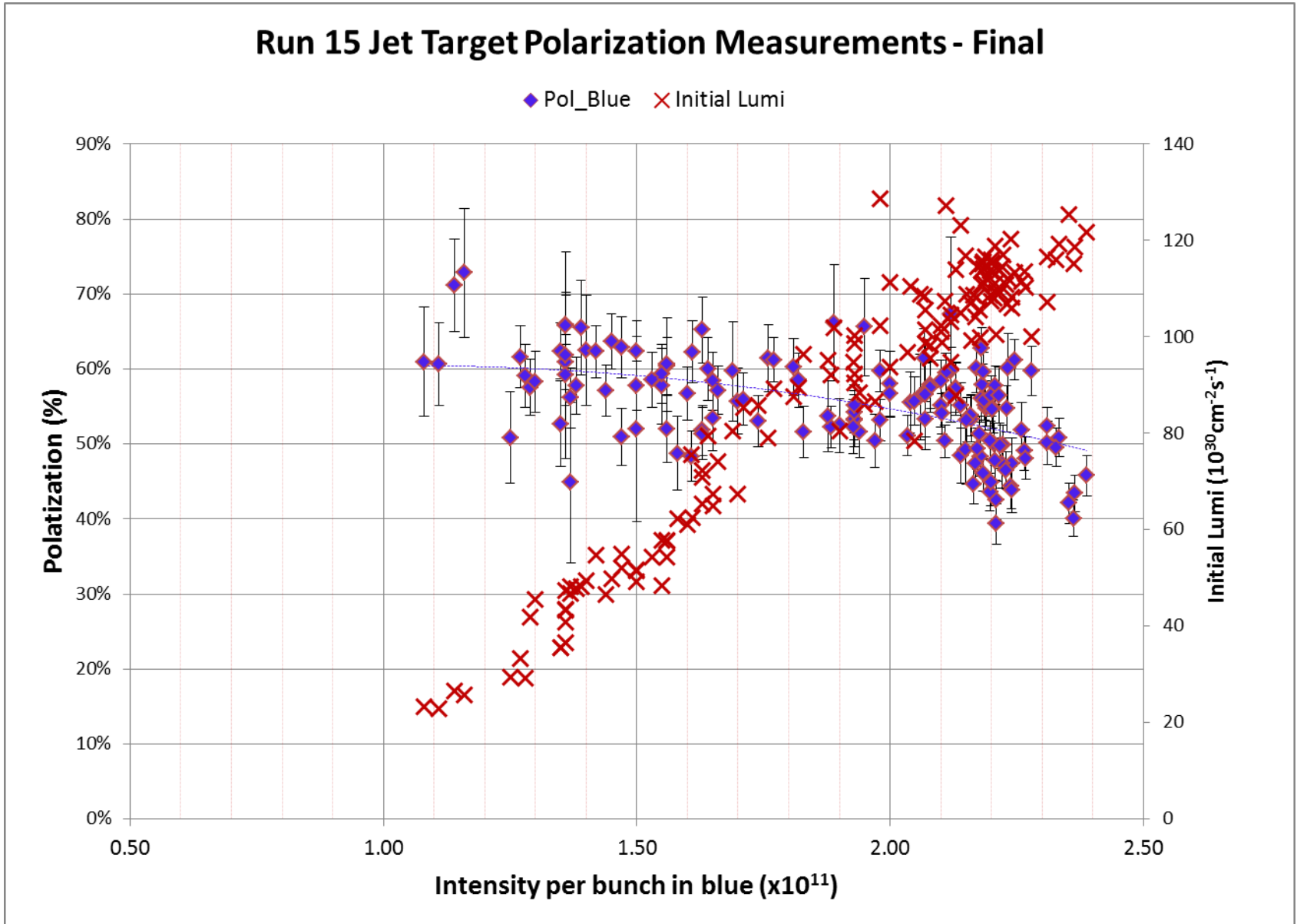
through final store 18953, 4/26/15



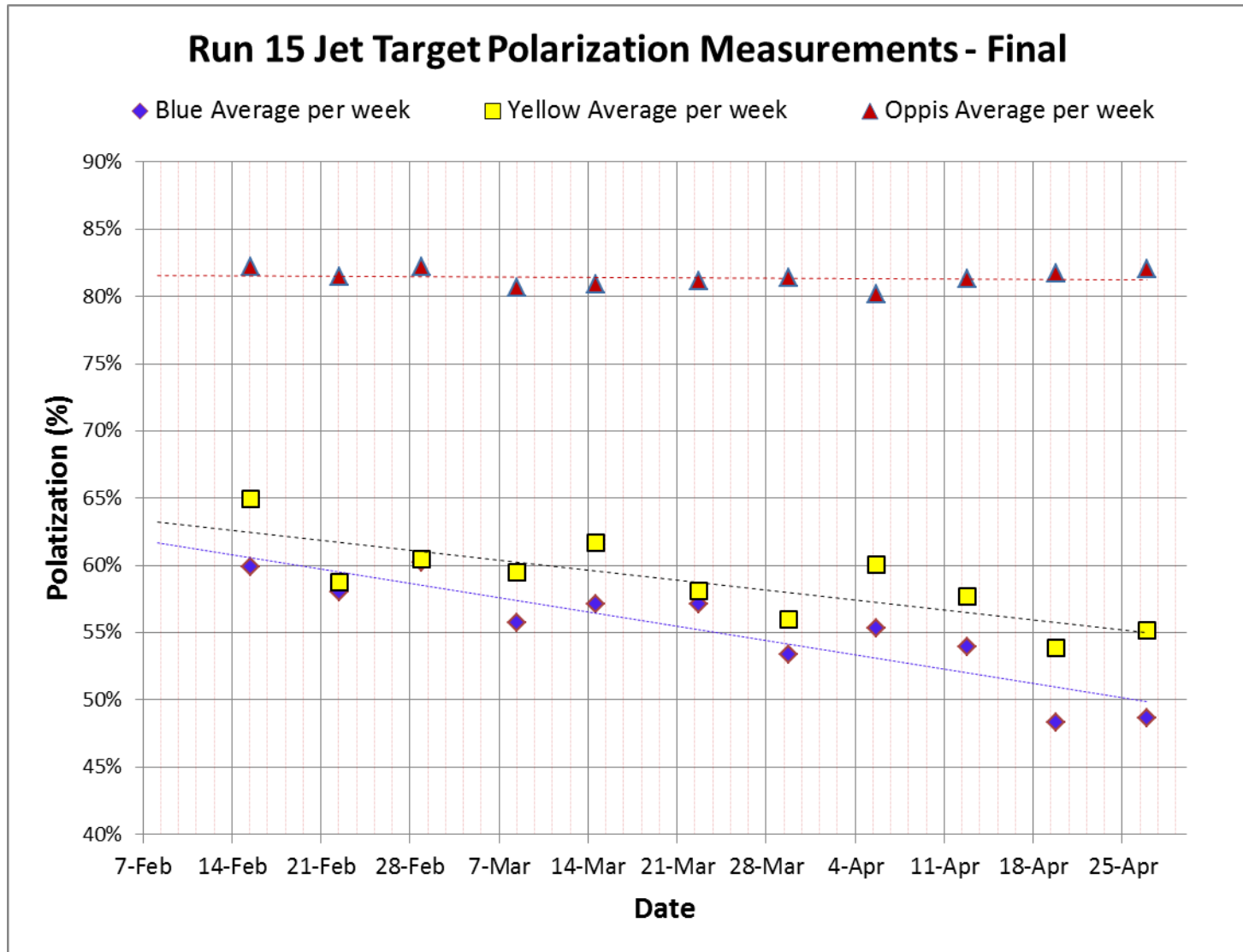
## Run 15 Jet Target Polarization Measurements - Final

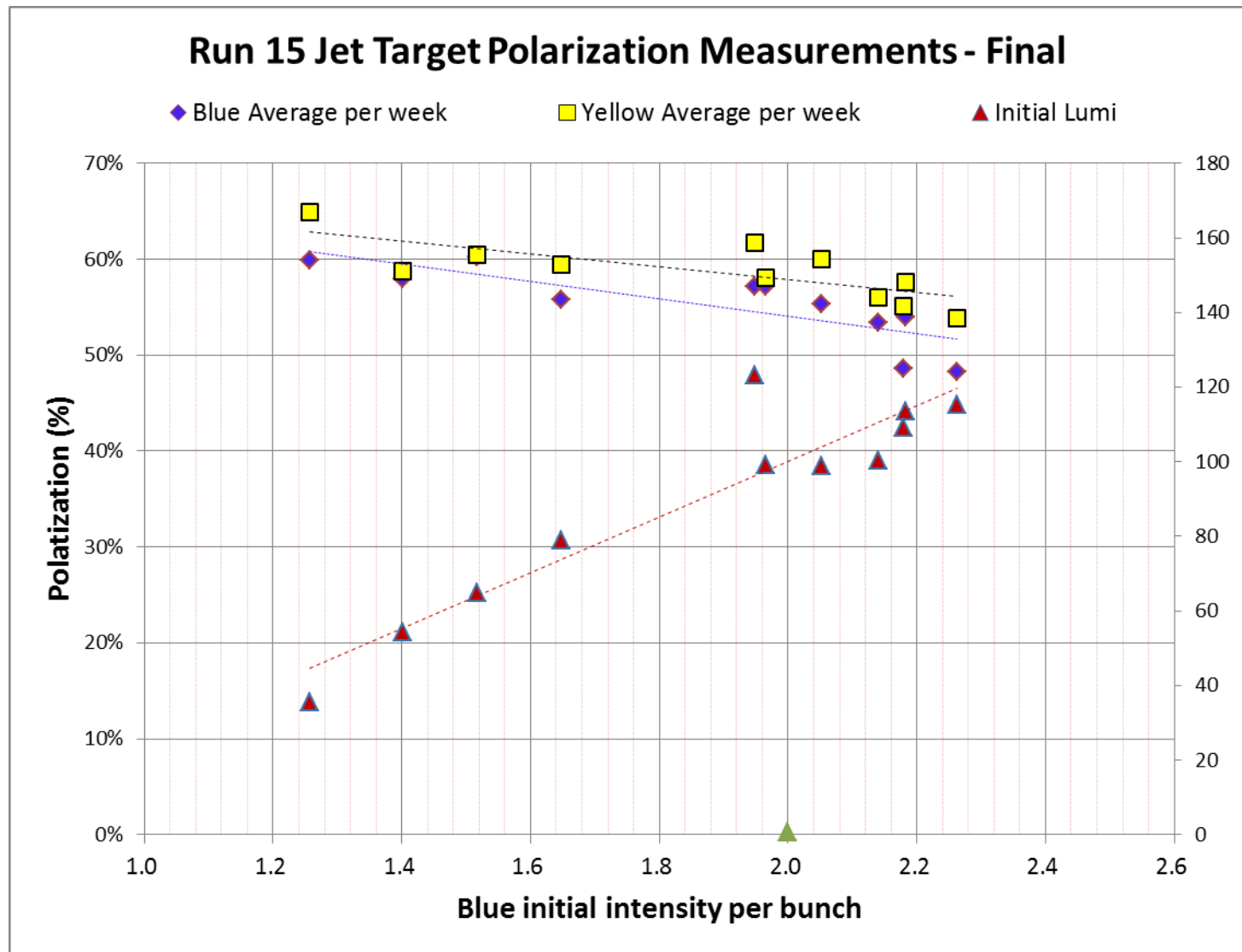






through final store 18953, 4/26/15





p<sup>^</sup>Au,  $\sqrt{s}$  = 200 GeV



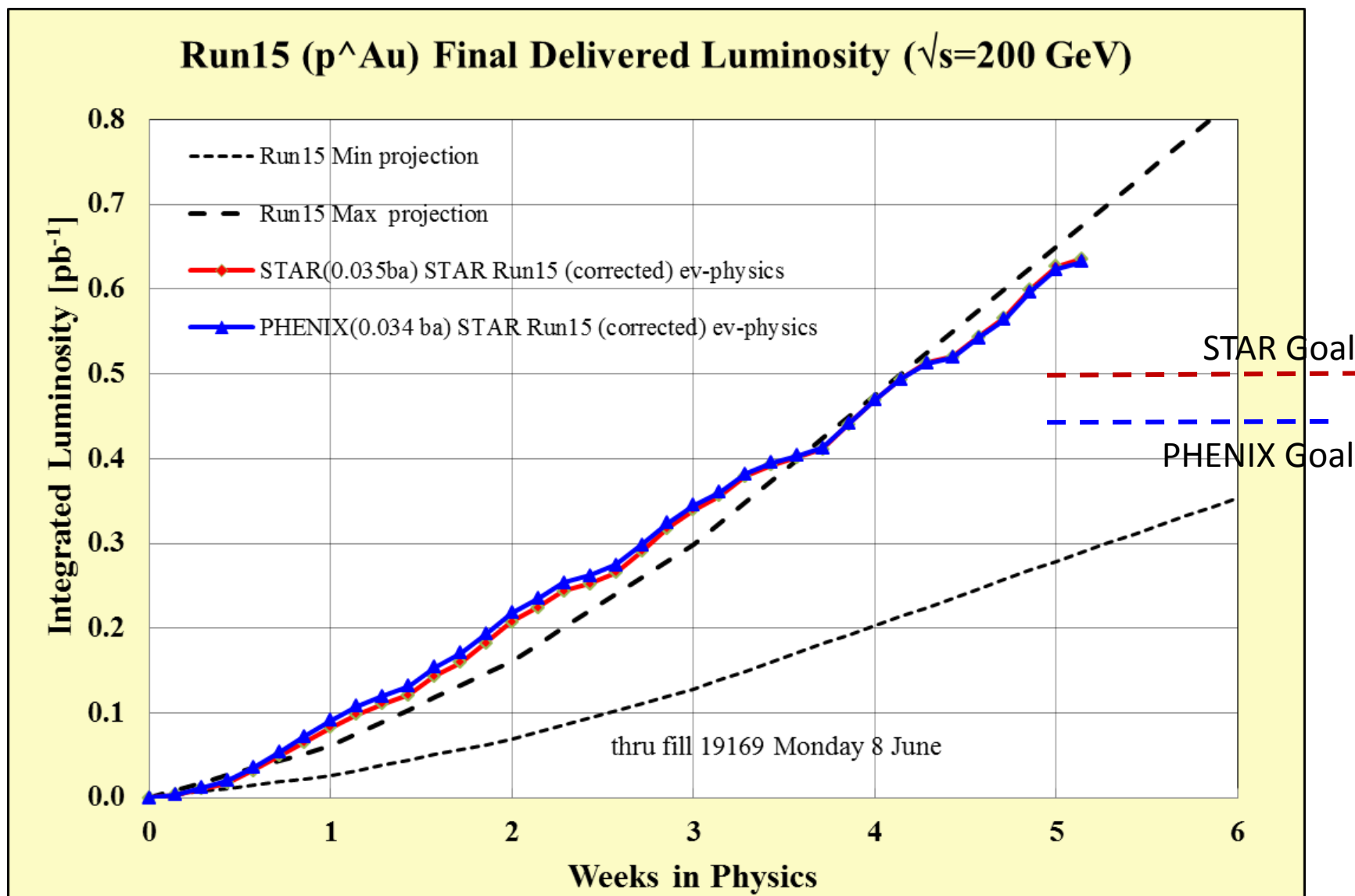
# p+Au @ 200 GeV, Experiment Goals

## PHENIX:

- 5 week goal is 190 nb<sup>-1</sup> sampled within  $|z| < 40$  cm and polarization (transverse) = 60%.
  - Assumptions:
    - Uptime = 70%
    - Fraction of events within 40 cm = 70%
    - Live Time = 90%
- delivered lumi =  $190 / (0.7 * 0.7 * 0.9) = 430 \text{ nb}^{-1}$

## STAR:

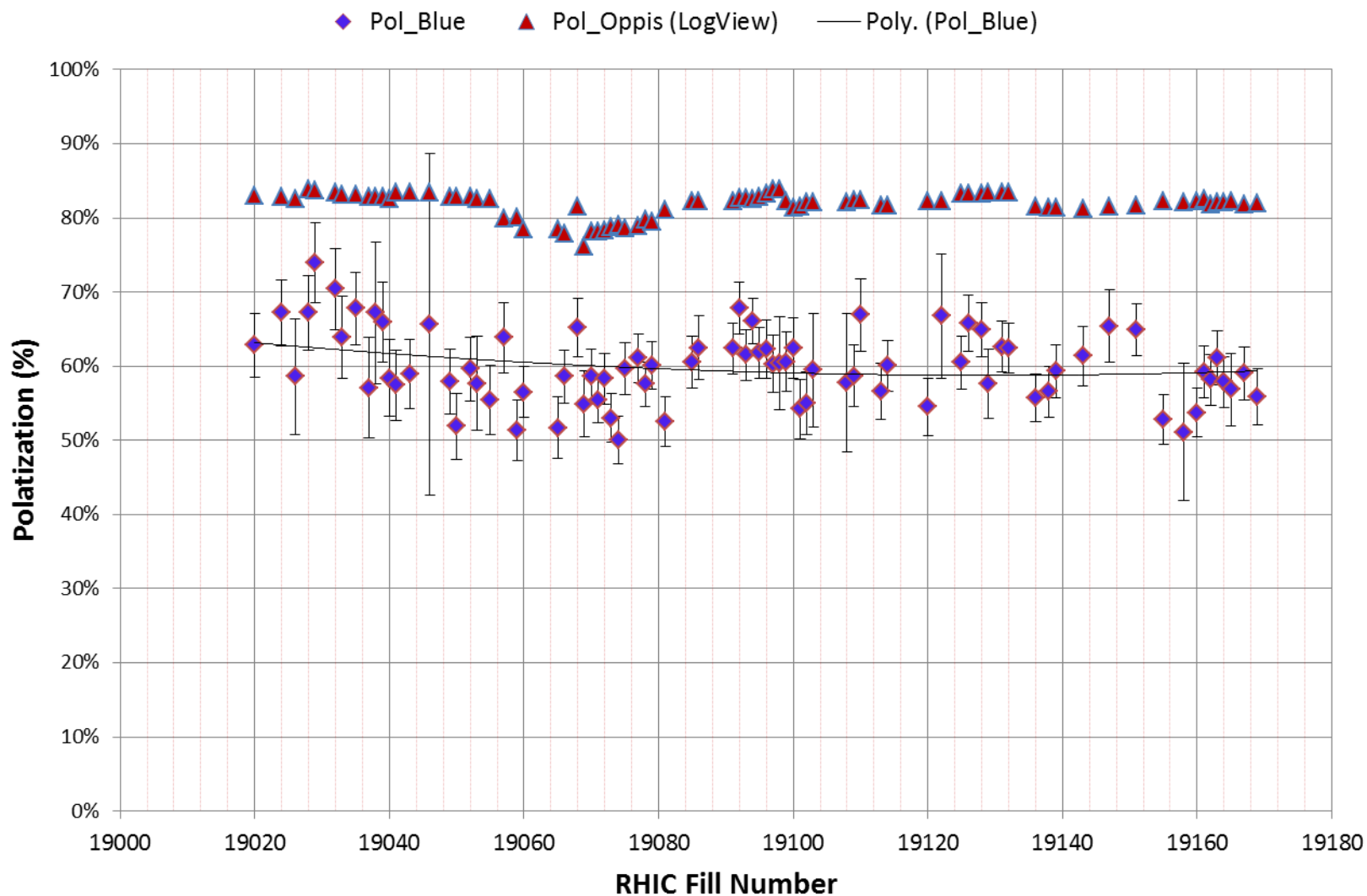
- 5 week goal is 300 nb<sup>-1</sup> sampled and polarization (transverse) = 60%.
  - Assumptions:
    - Sampling efficiency = 60%
- delivered lumi =  $300 / (0.6) = 500 \text{ nb}^{-1}$

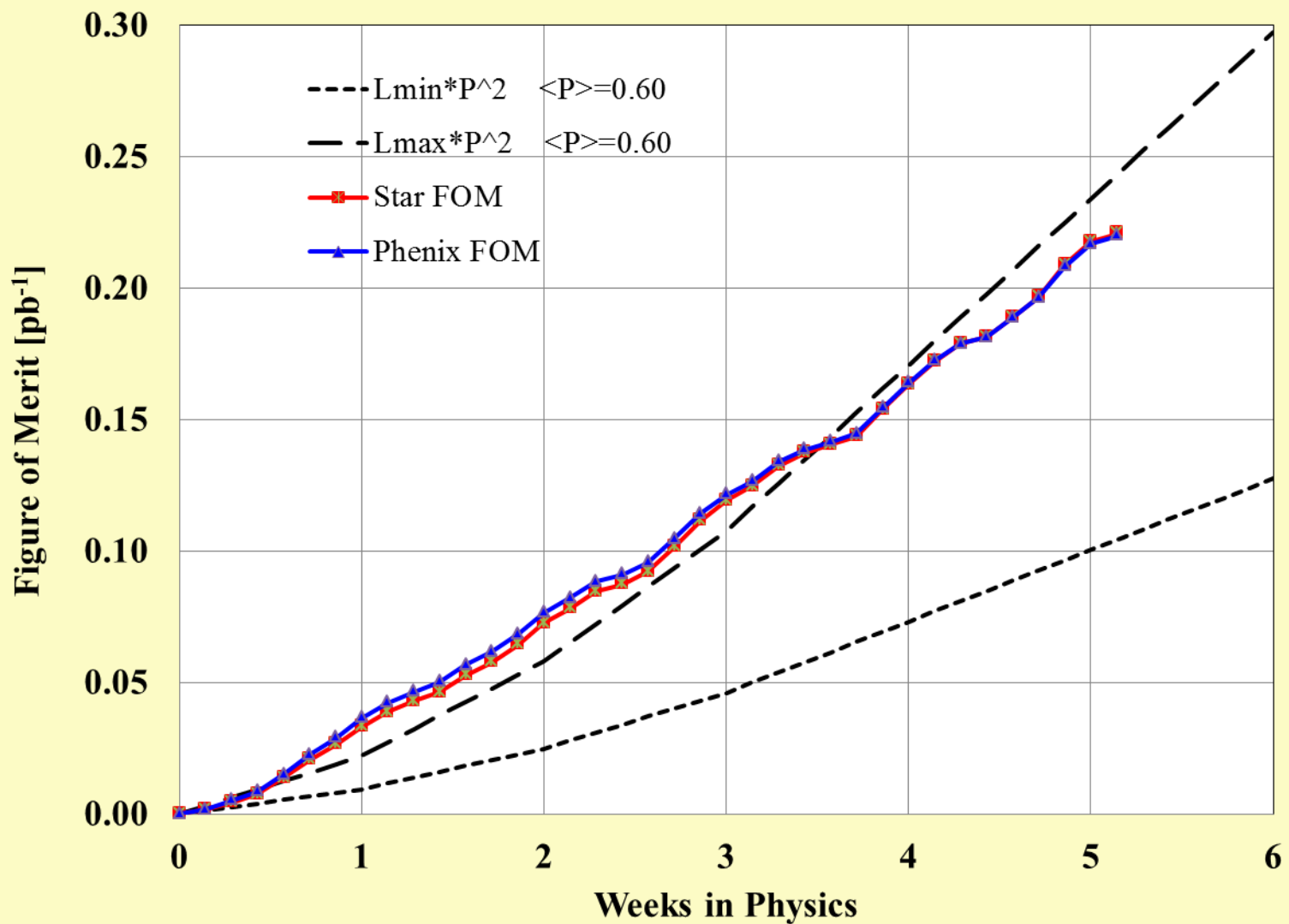


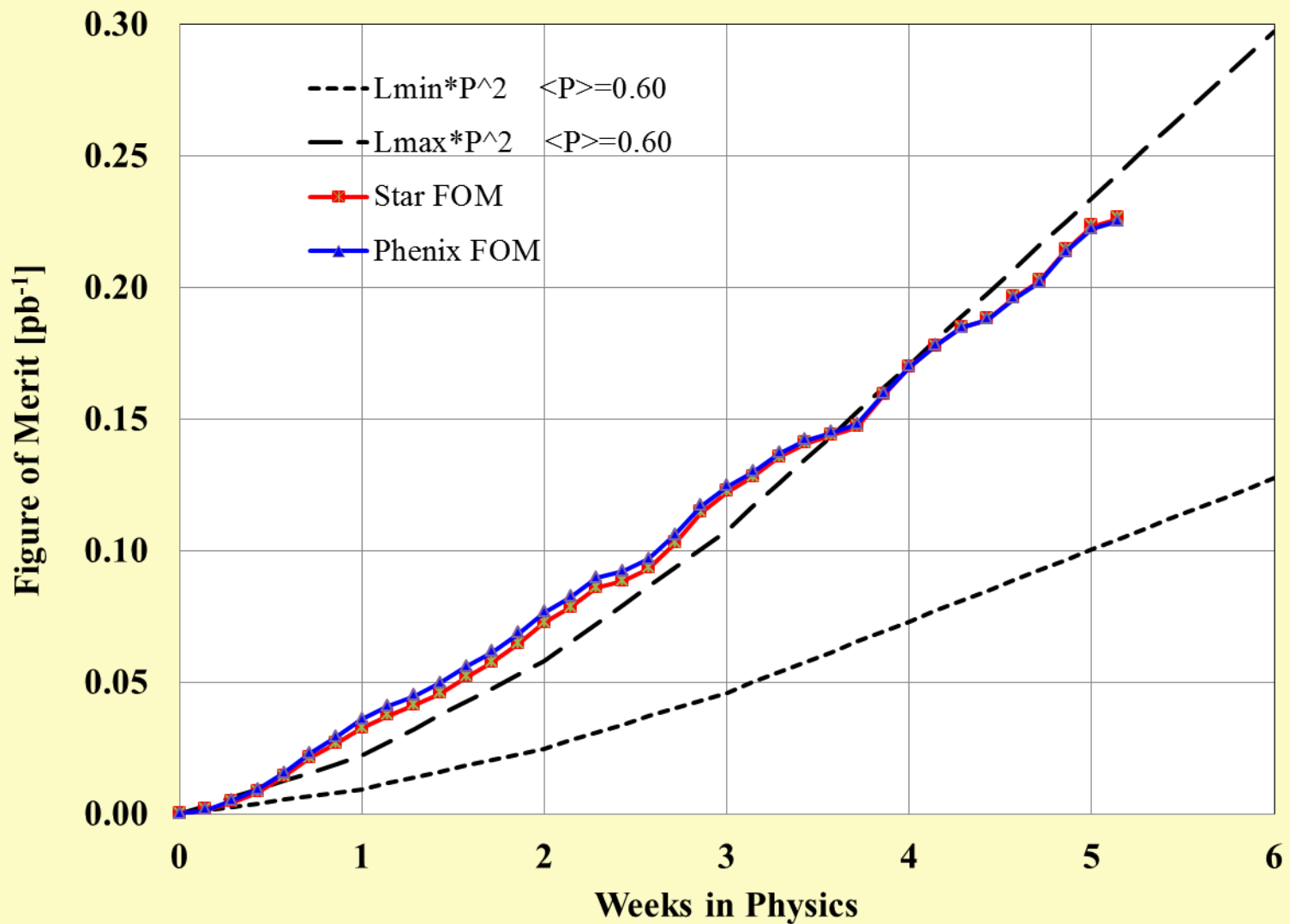
error weighted average  $58.6 \pm 0.45\%$

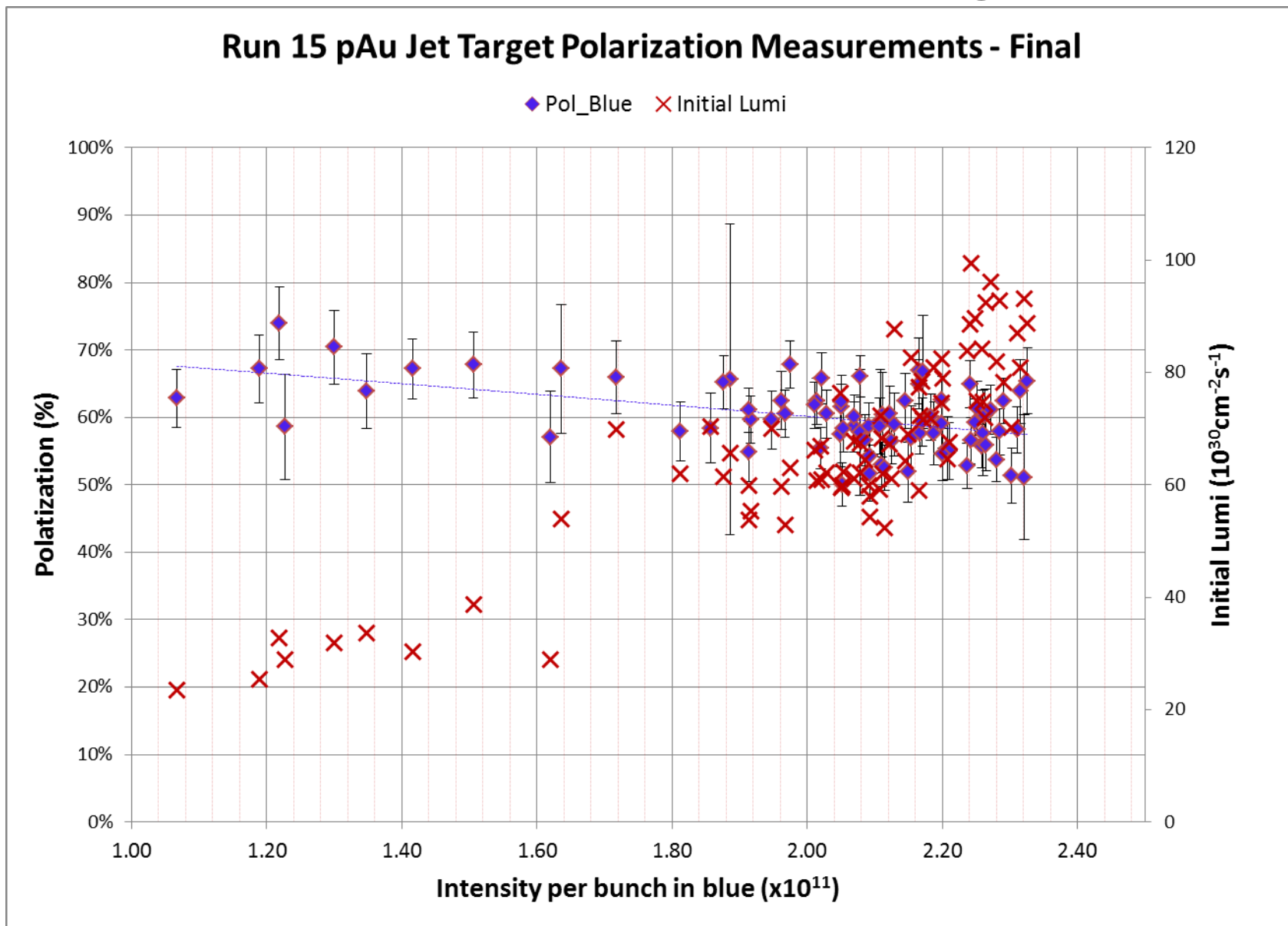
Through final fill 19169, 6/8/15

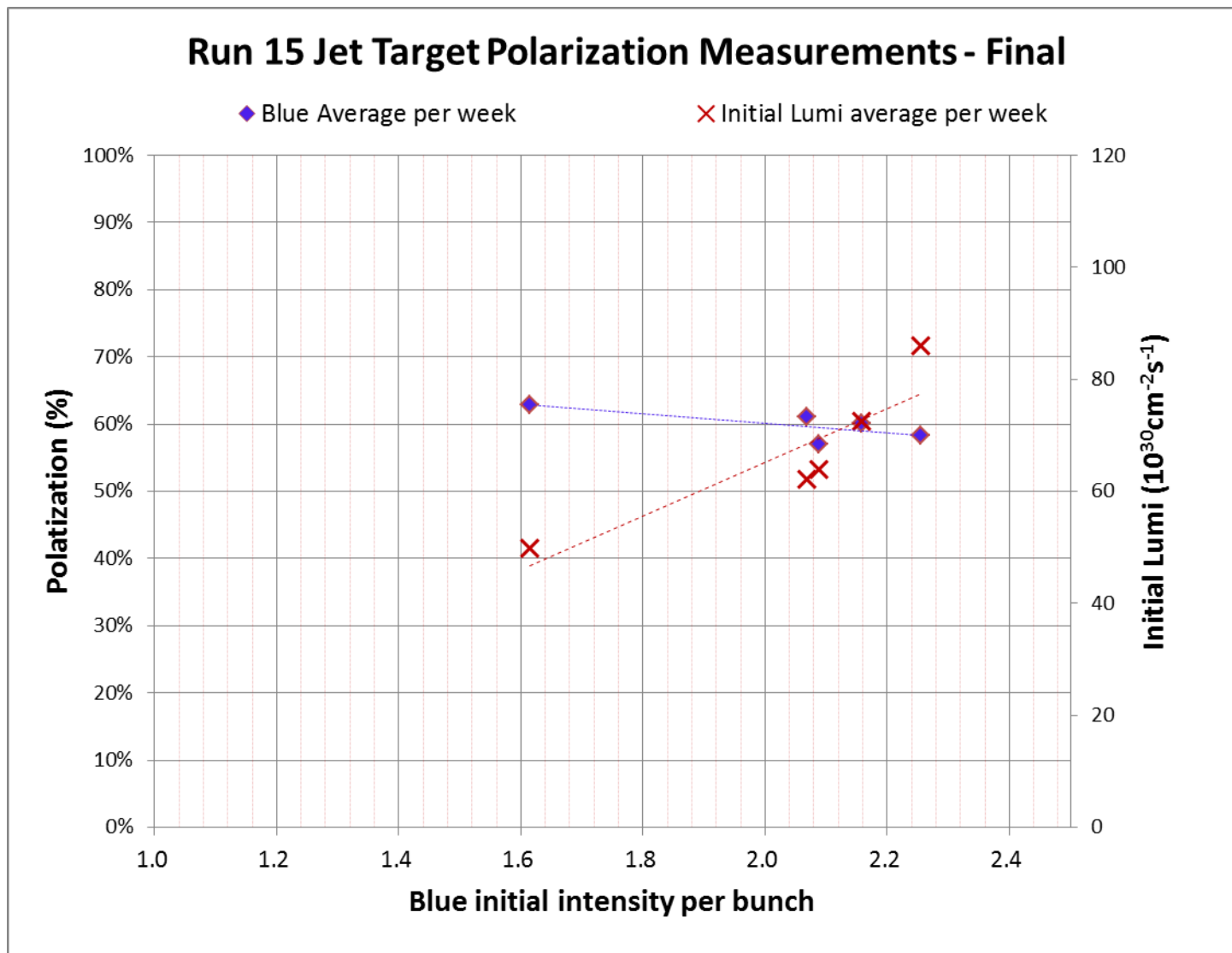
## Run 15 pAu Jet Target Polarization Measurements - Final



**Run15 p<sup>+</sup>Au CNI Figure of Merit [LP<sup>2</sup>]**

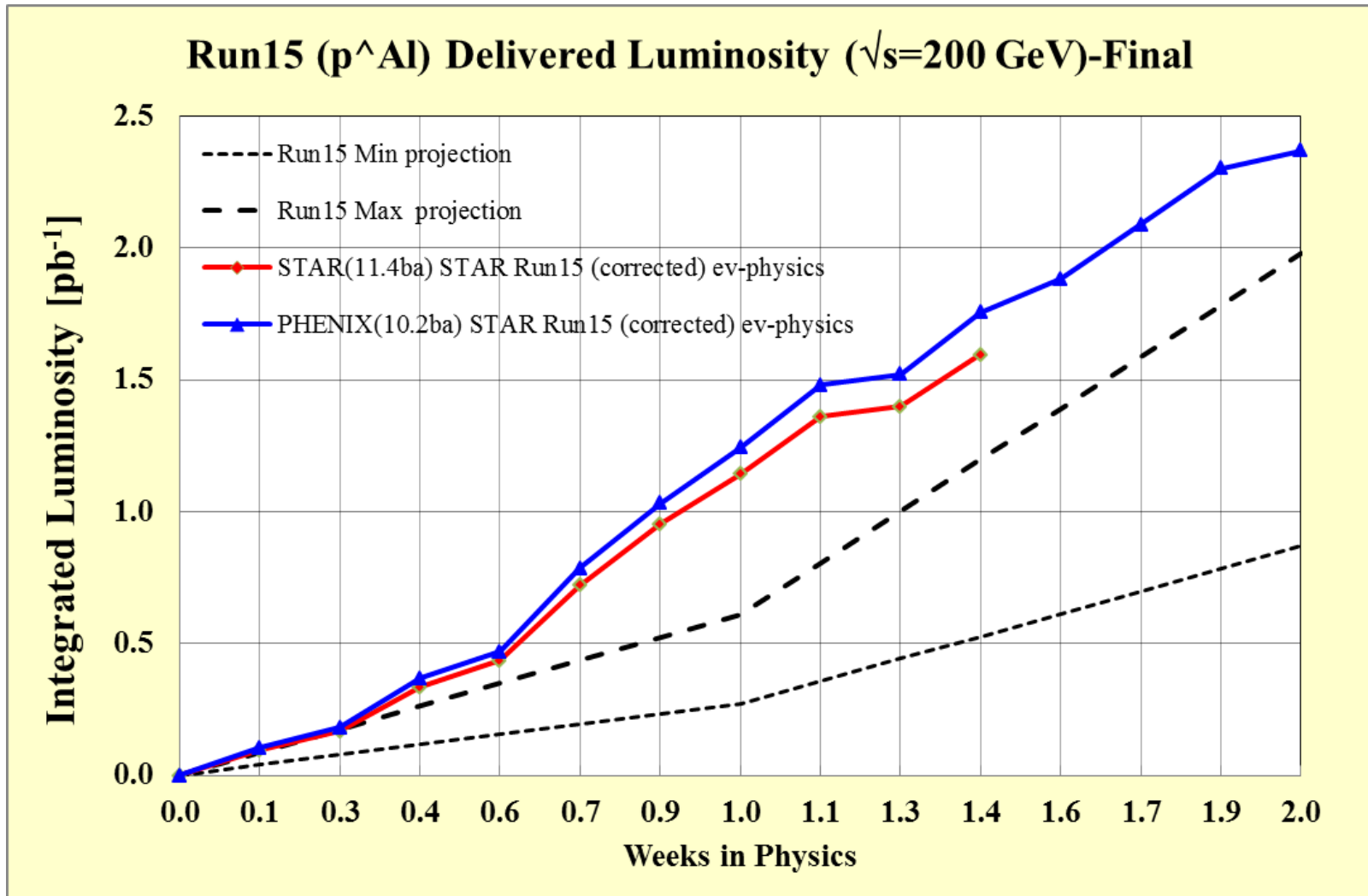
**Run15 p<sup>+</sup>Au Jet Figure of Merit [LP<sup>2</sup>]**





p<sup>Al</sup>,  $\sqrt{s}$  = 200 GeV

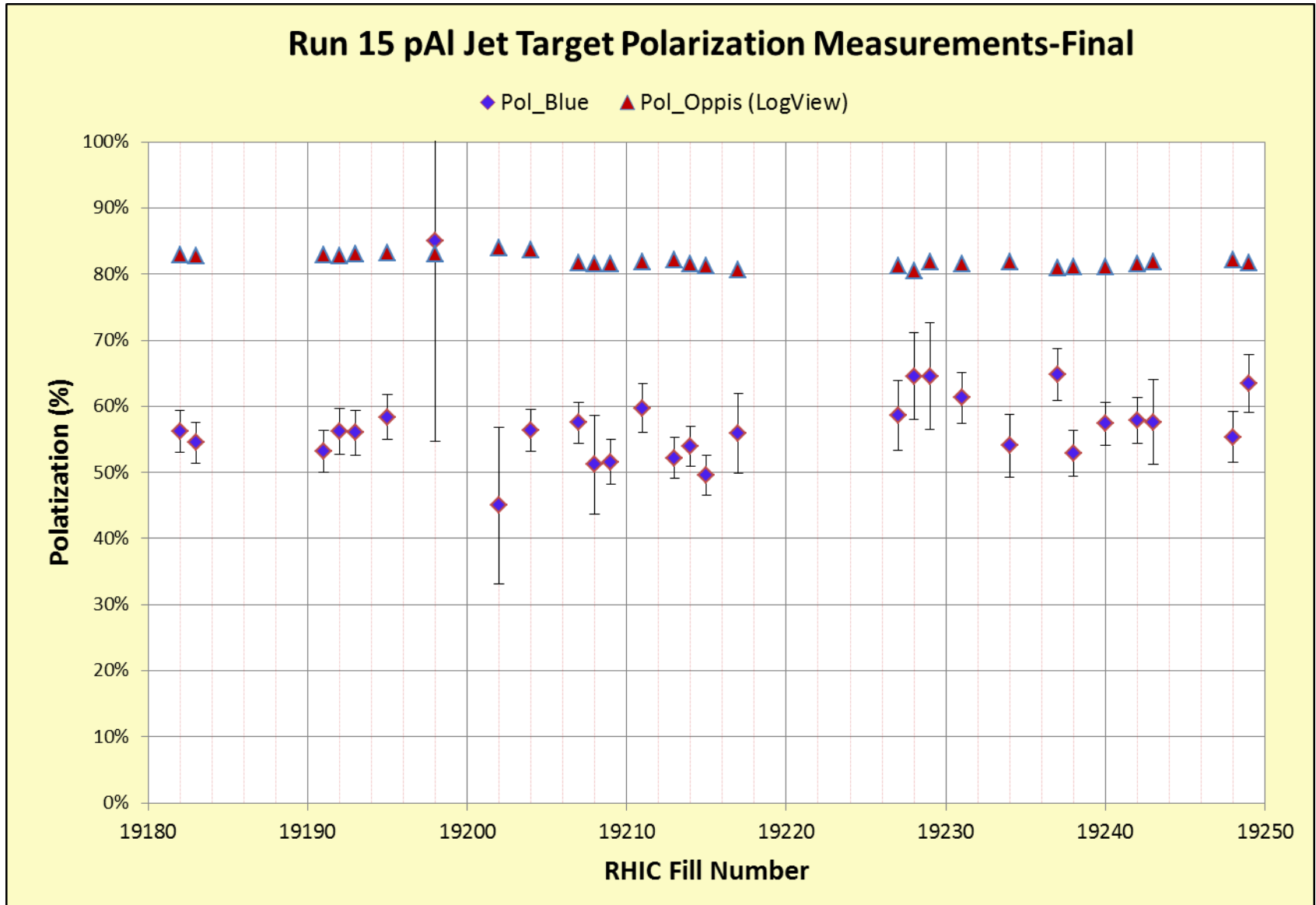


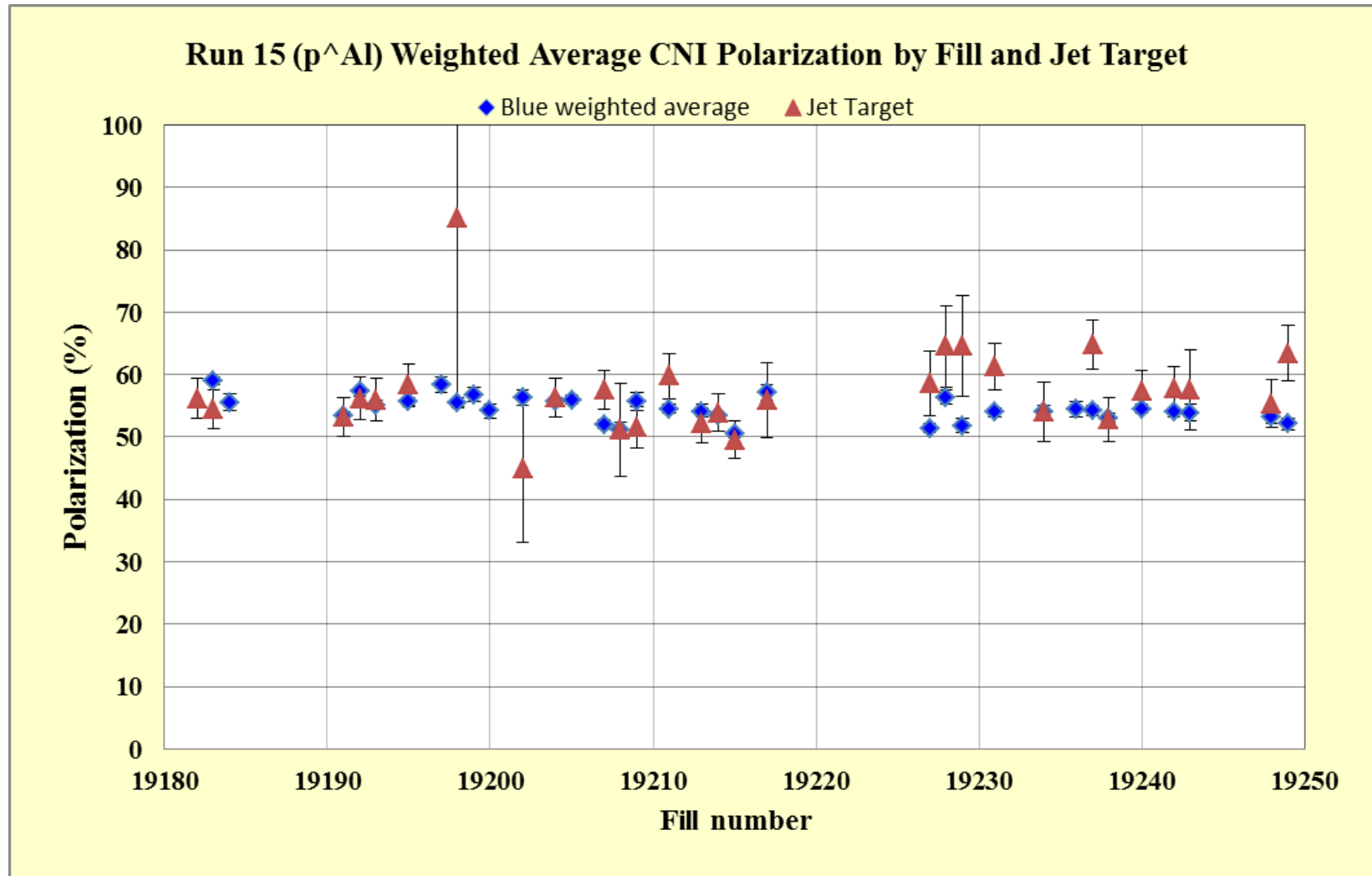


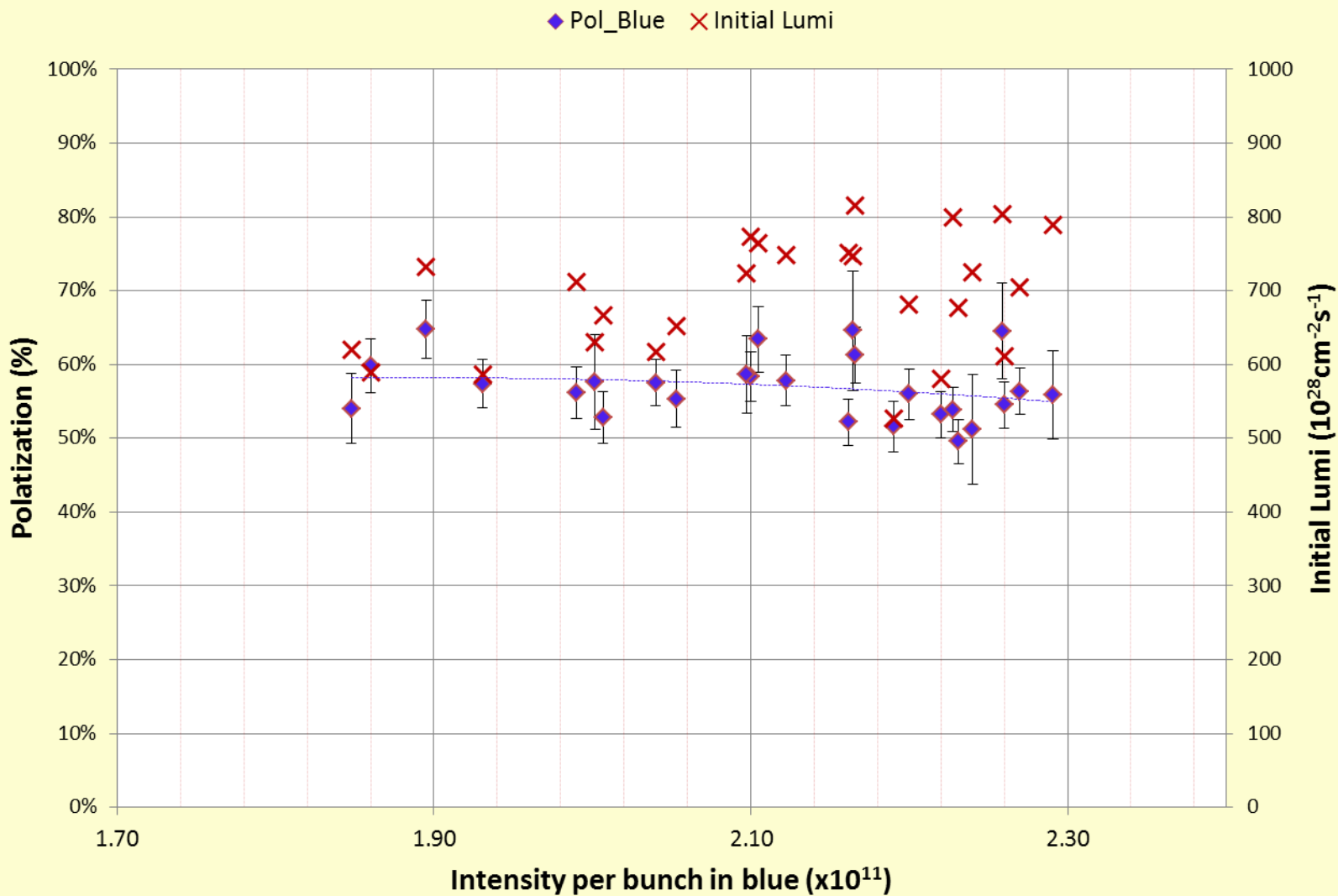
STAR Goal 1.85  $\text{pb}^{-1}$  recorded (dimuon, to match transverse pp run)  $\rightarrow$   $\sim 3$   $\text{pb}^{-1}$  delivered

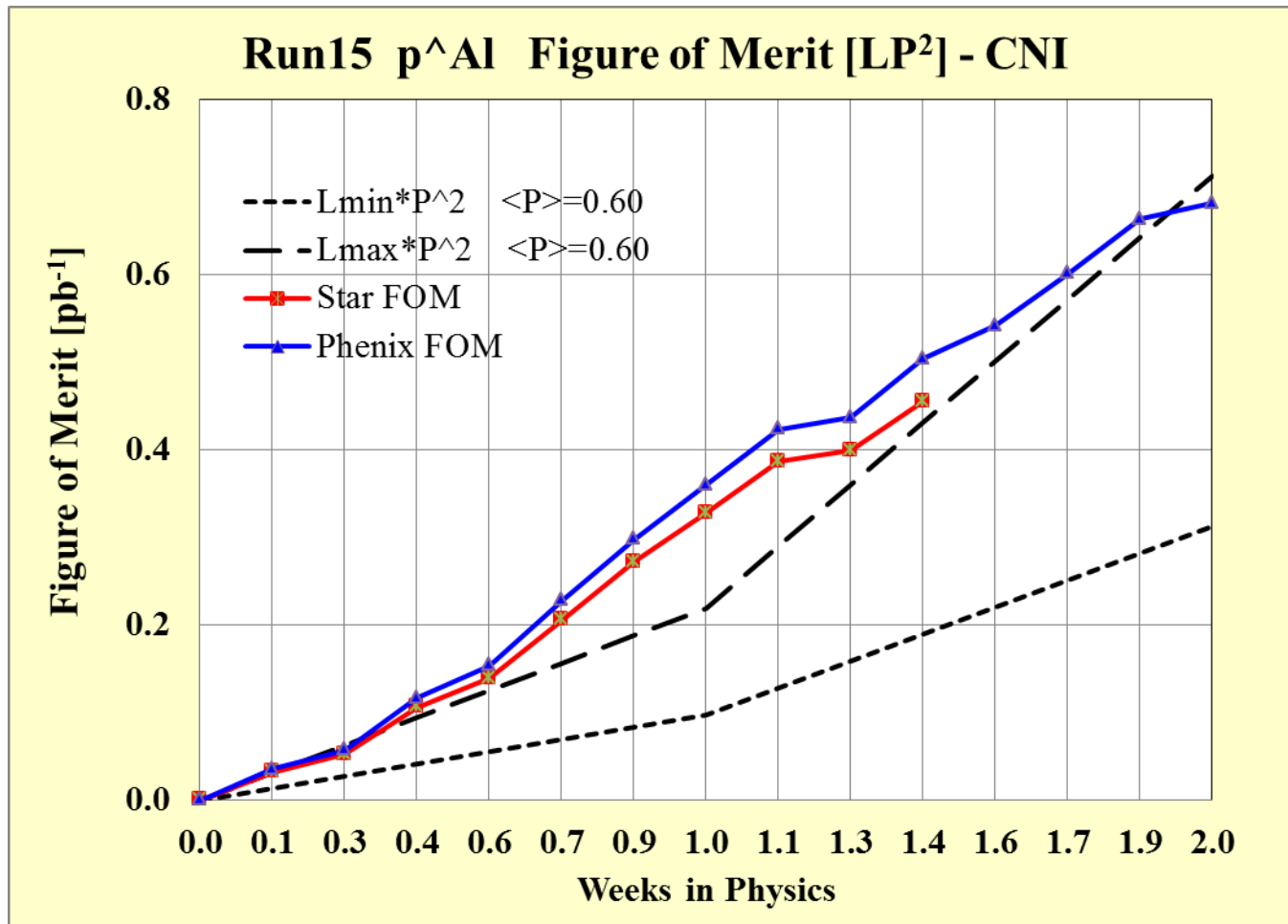
error weighted average  $56.0 \pm 0.71\%$

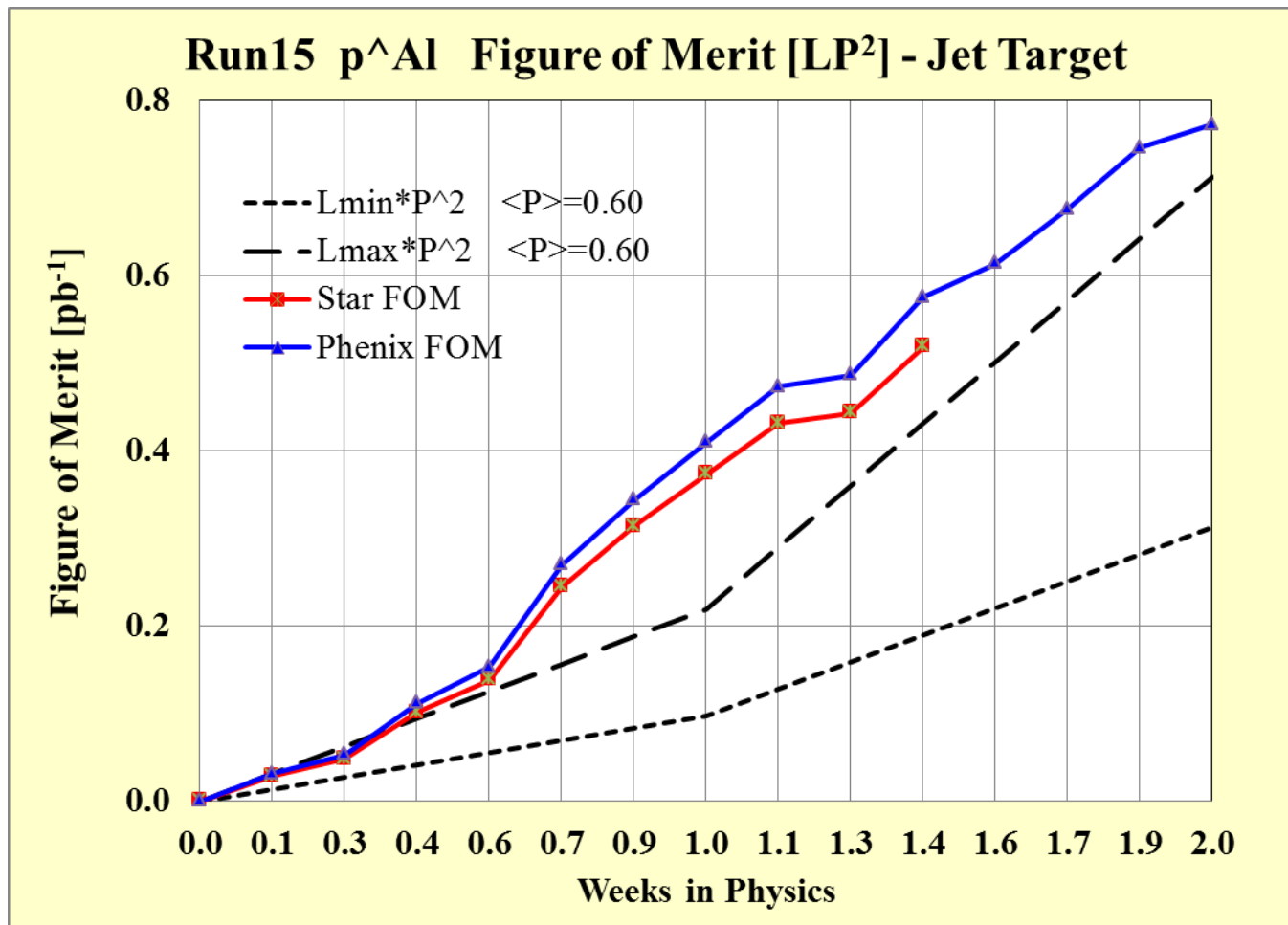
Through final fill 19249, 6/22/15

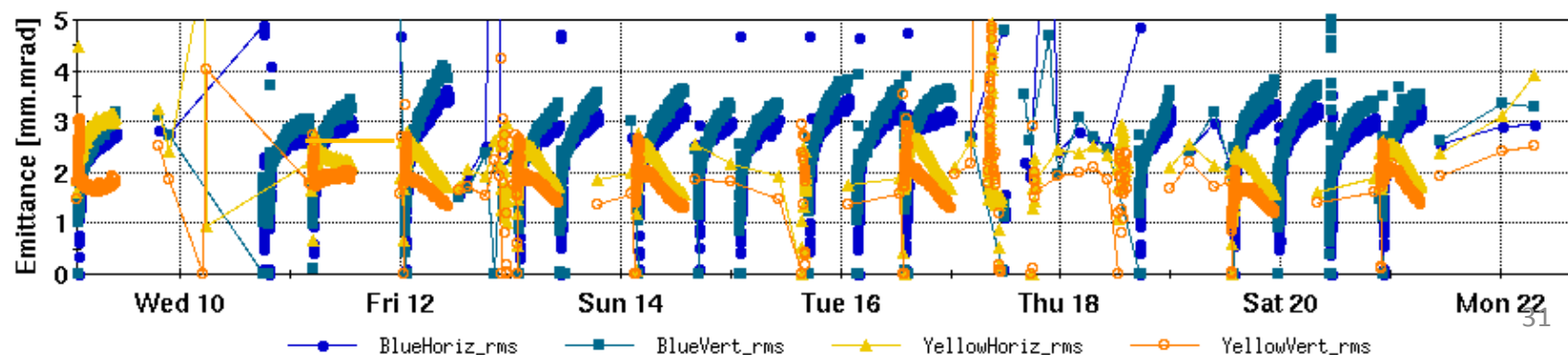
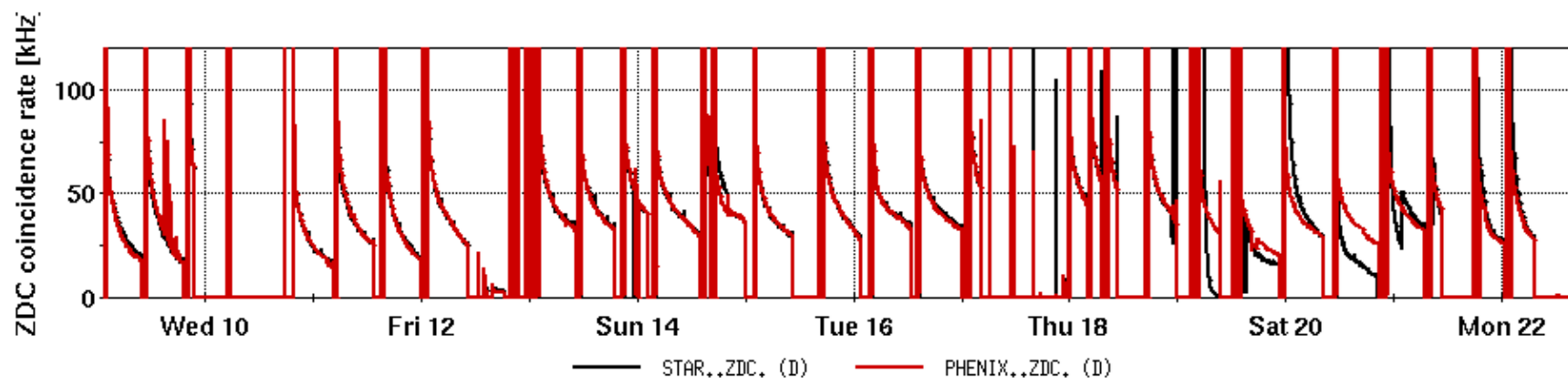
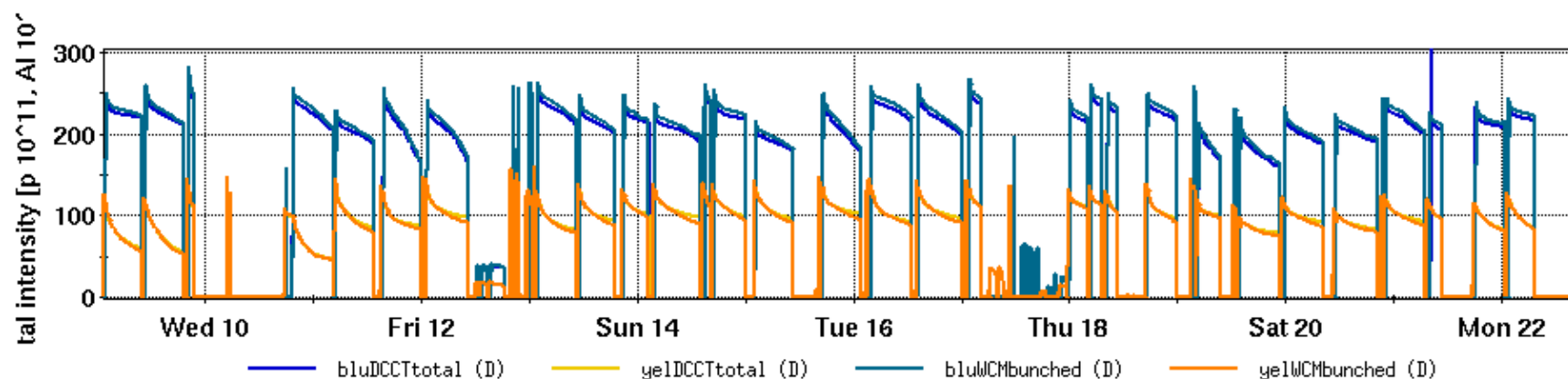




**Run 15 pAl Jet Target Polarization Measurements**





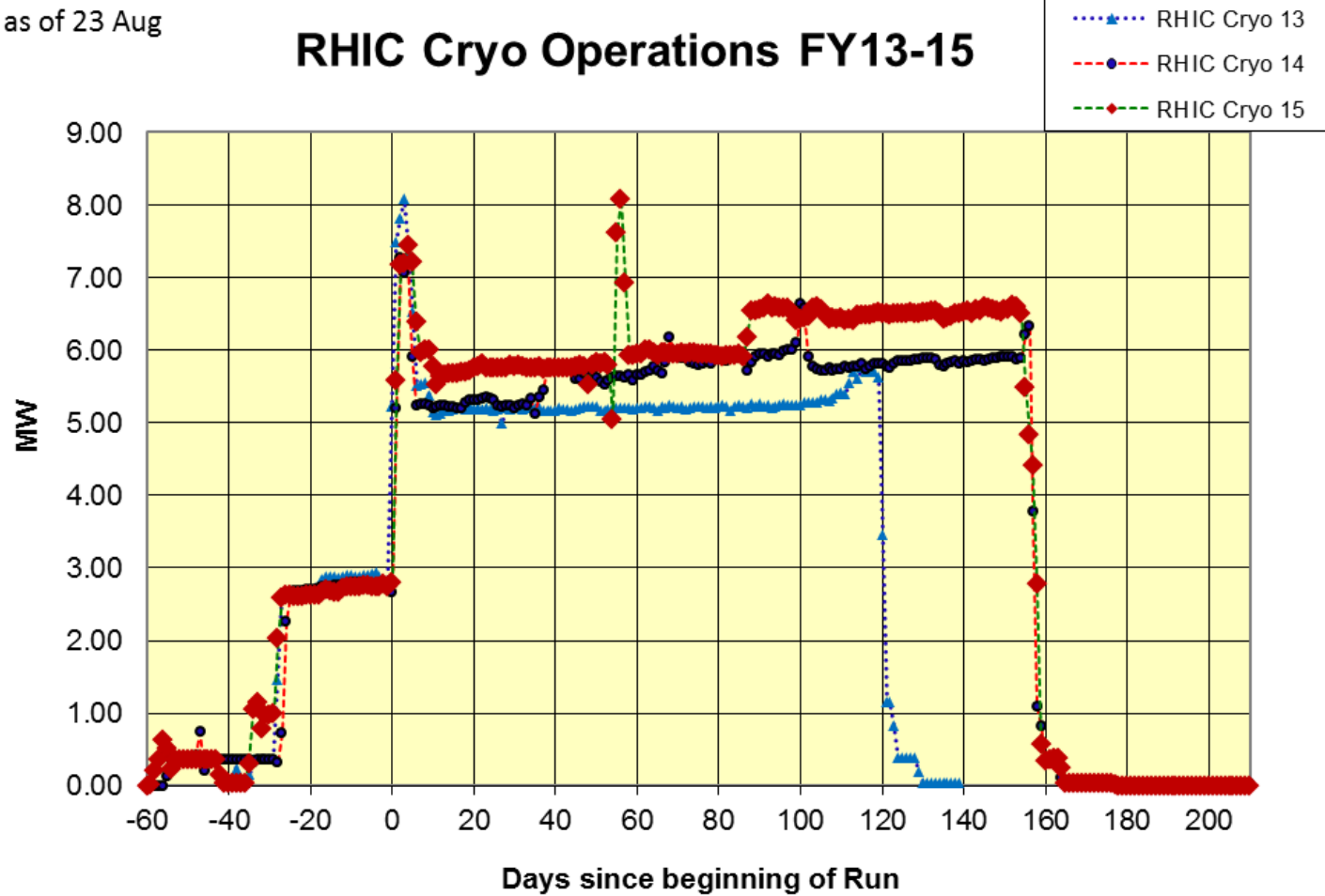


# Power



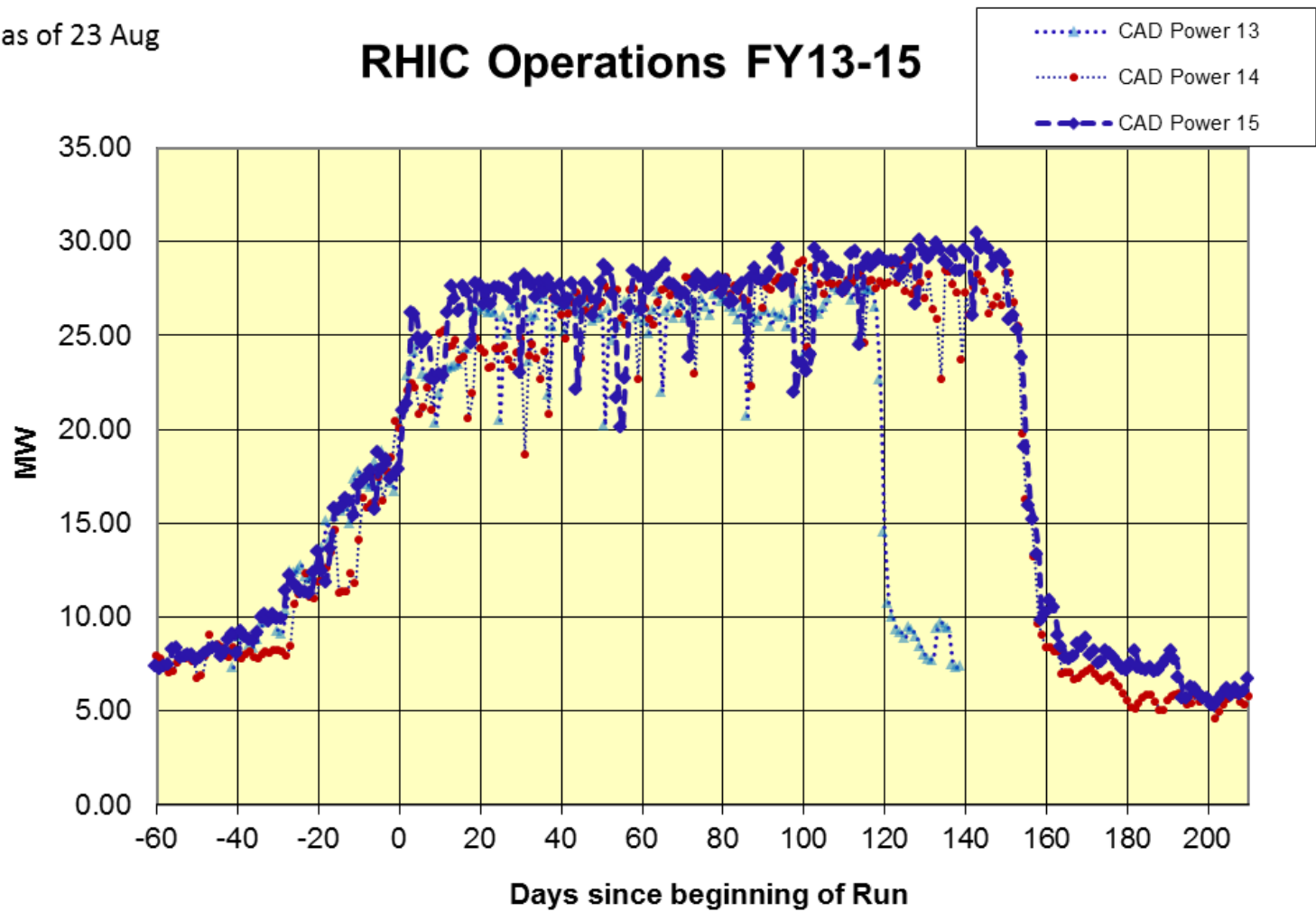
as of 23 Aug

## RHIC Cryo Operations FY13-15

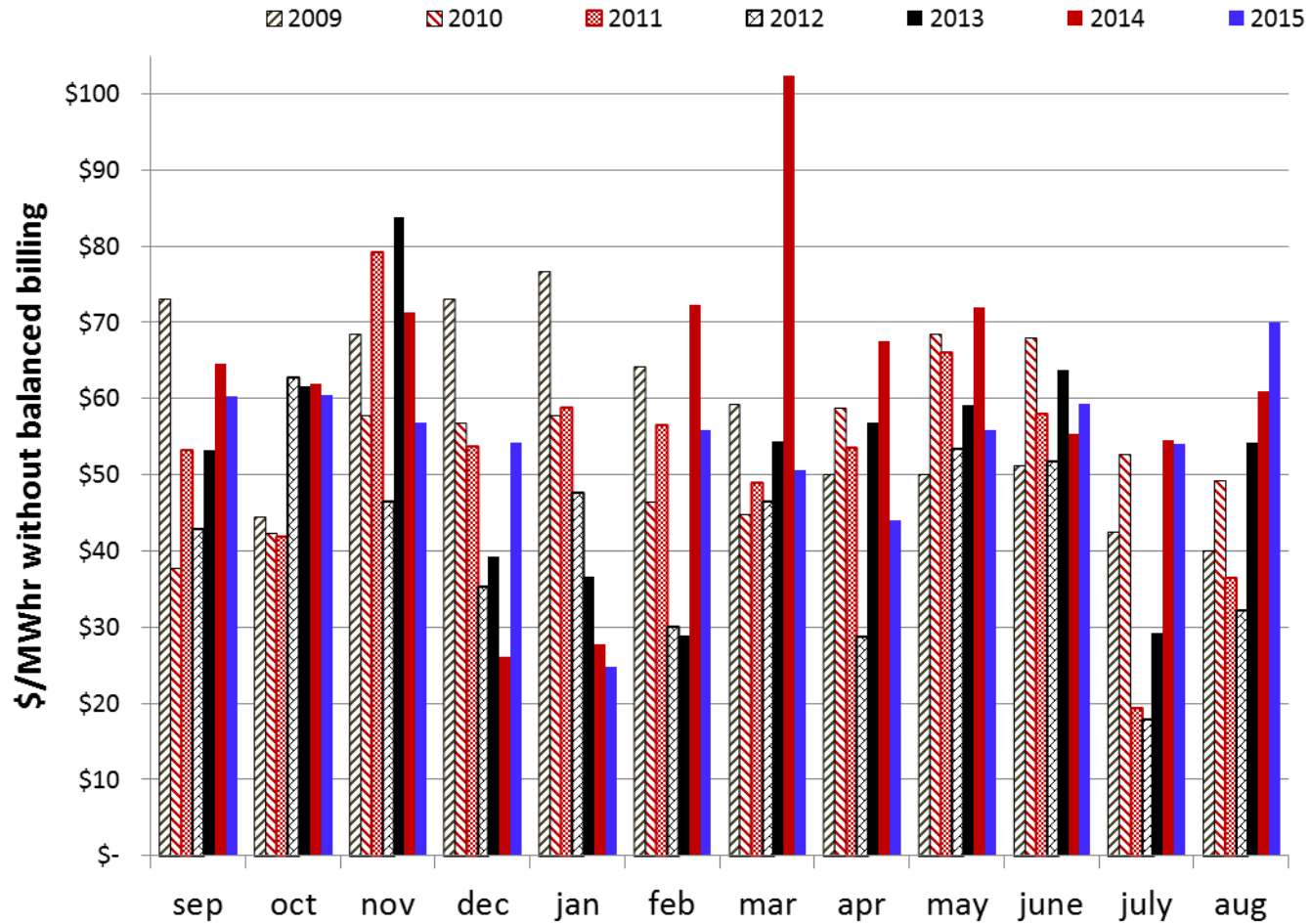


as of 23 Aug

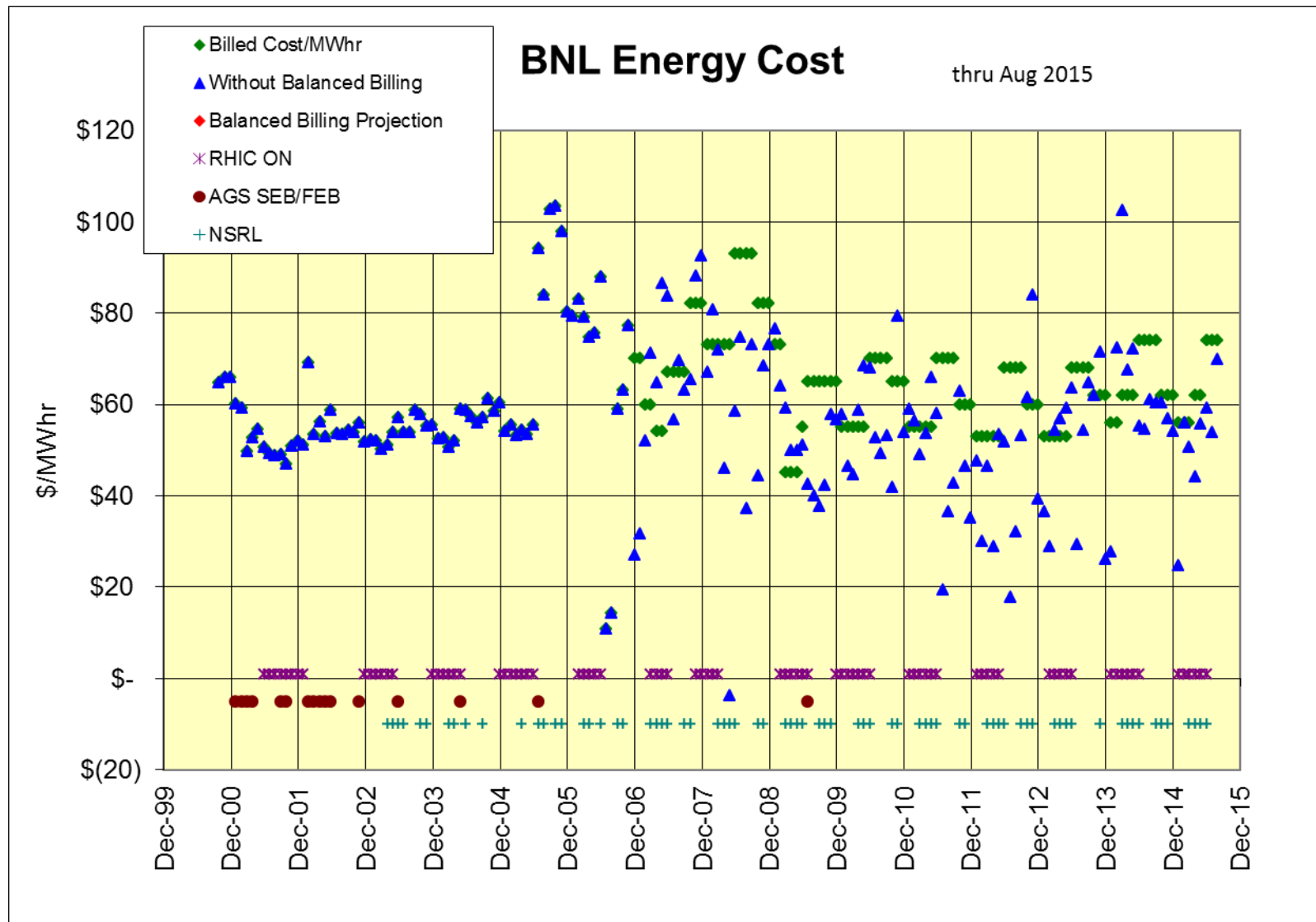
## RHIC Operations FY13-15



## BNL Electricity Cost

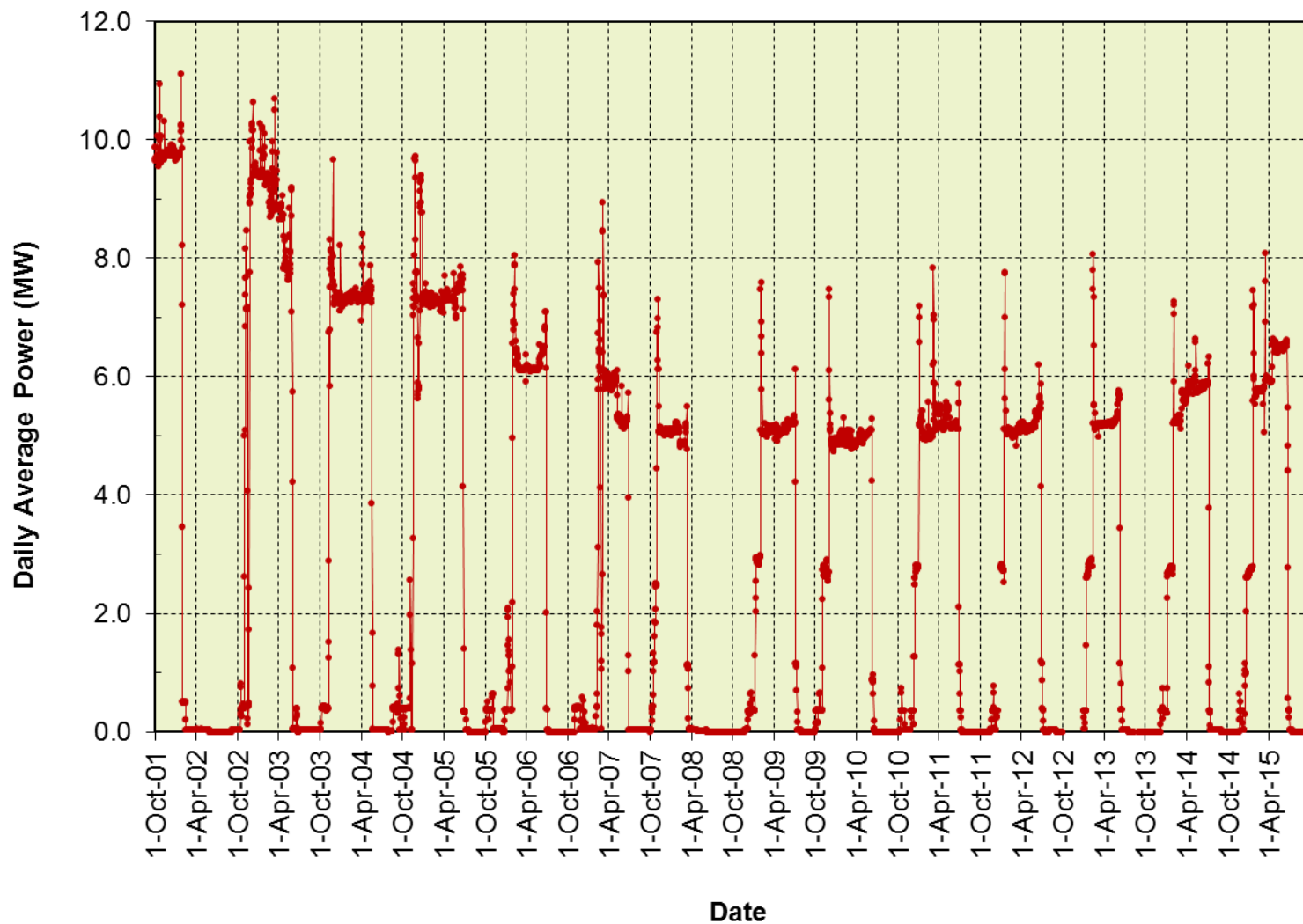


## Balanced Billing for the lab - +3,137K through Aug 2015



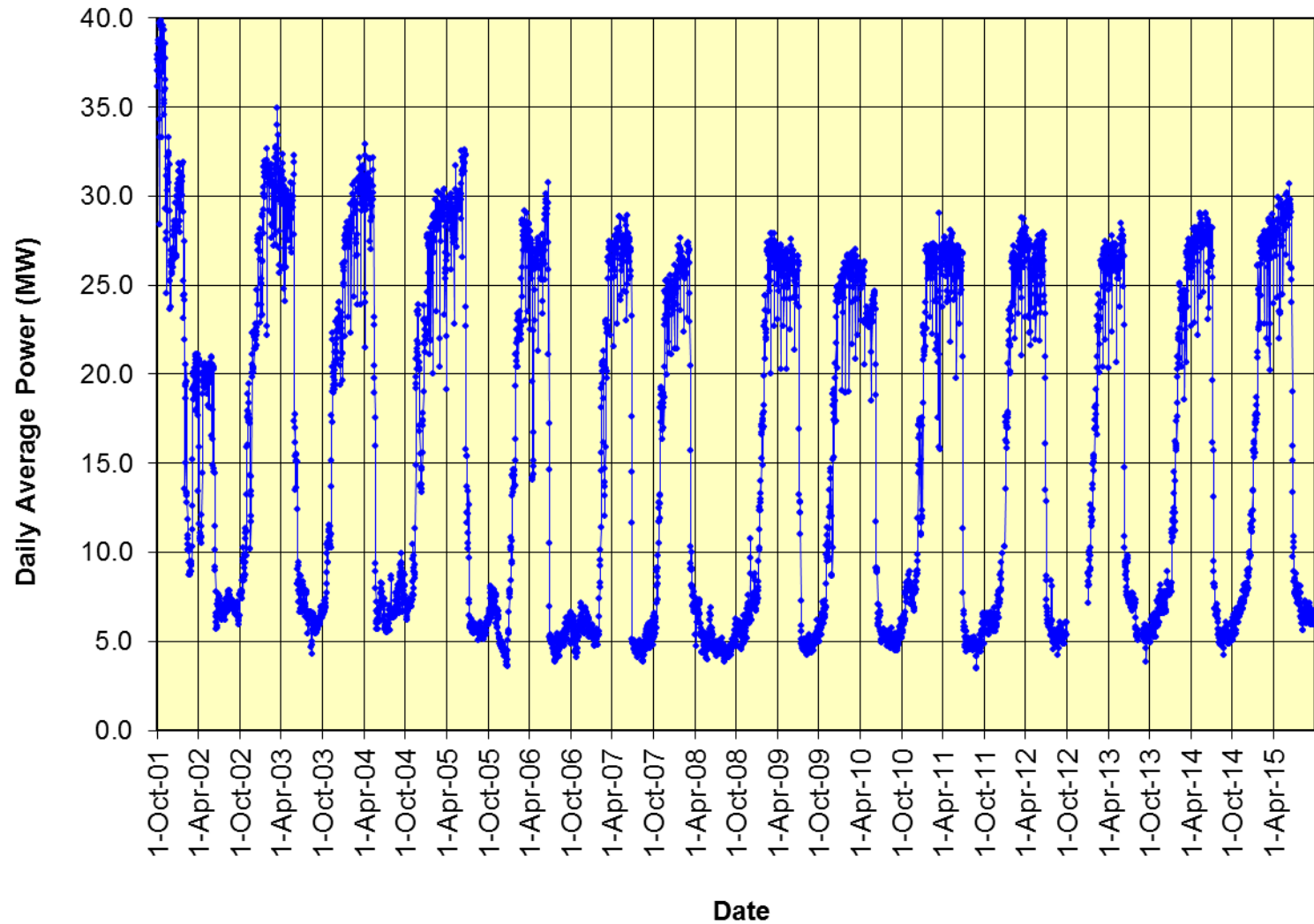
as of 30 Sep 2015

## C-AD Cryo Energy Use FY 2002-15



as of 30 Sep 2015

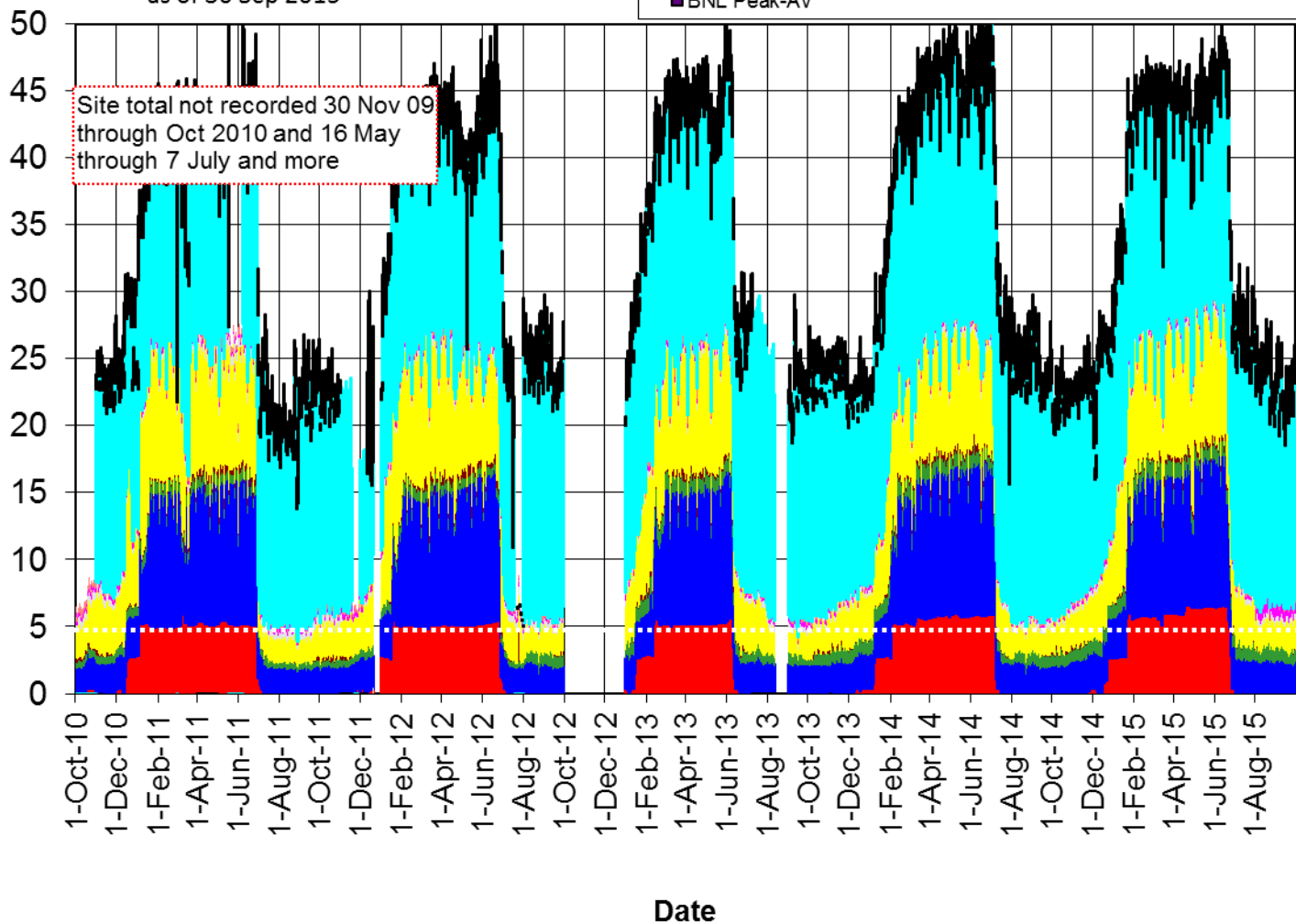
## C-AD Energy Use FY 2002-15



# BNL Energy Use FY 2011-15

as of 30 Sep 2015

Daily Average Power (MW)



# Archive



# Run 15 original plan based on 22 weeks cryo operation

and Fischer et.al. RHIC Collider Projections (FY 2013 – FY 2022), 21 Sep 2014

- 20 Jan, Begin cool-down to 4.5K
- 21 Jan (morning), Blue cold
- 22 Jan (evening), Yellow cold
- 23 Jan (after midnight), Beam in Blue
- 7 Feb, First overnight stores for experiments
- 10 Feb (3 days early) store 18662, Begin 9 week  **$\sqrt{s}=200$  GeV pp** physics run
- 17 April (Fri), End 9 week  $\sqrt{s}=200$  GeV pp physics run
- 28 April (Tue), Begin 5 week  **$\sqrt{s}=200$  GeV/n pAu** physics run
- 2 June (Tue), End 5 week  $\sqrt{s}=200$  GeV/n pAu physics run
- 5 June (Fri), Begin 2 week  **$\sqrt{s}=200$  GeV/n pAl** physics run
- 19 June (Fri), End 2 week  $\sqrt{s}=200$  GeV/n pAl physics run
- 19 June (Fri), begin cryo warm-up
- 23 June, cryo warm-up complete, **22.0 cryo weeks** of operation

See <http://www.rhichome.bnl.gov/AP/Spin2015/> for the Run Coordinator's detailed plan<sup>41</sup>

## The Plan for Run 15: 22 weeks of cryo operations

|  |           |                                     |
|--|-----------|-------------------------------------|
| Cool-down from 50 K to 4 K                         | 0.5 weeks |                                     |
| Set-up mode 1 ( $p\uparrow+p\uparrow$ at 100 GeV)  | 2.5 weeks | (no dedicated time for experiments) |
| Ramp-up mode 1                                     | 0.5 weeks | (8 h/night for experiments)         |
| Data taking mode 1                                 | 9 weeks   |                                     |
| Set-up mode 2 ( $p\uparrow+Au$ at 100 GeV/nucleon) | 1.5 weeks | (no dedicated time for experiments) |
| Data taking mode 2 with further ramp-up            | 5 weeks   |                                     |
| Set-up mode 3 ( $p\uparrow+Al$ at 100 GeV/nucleon) | 0.5 weeks | (no dedicated time for experiments) |
| Data taking mode 3+1 with further ramp-up          | 2 weeks   |                                     |
| Warm-up  | 0.5 week  |                                     |

**From Fischer et. al., RHIC Collider Projections (FY 2014 – FY 2022), 21 Sep 2014**